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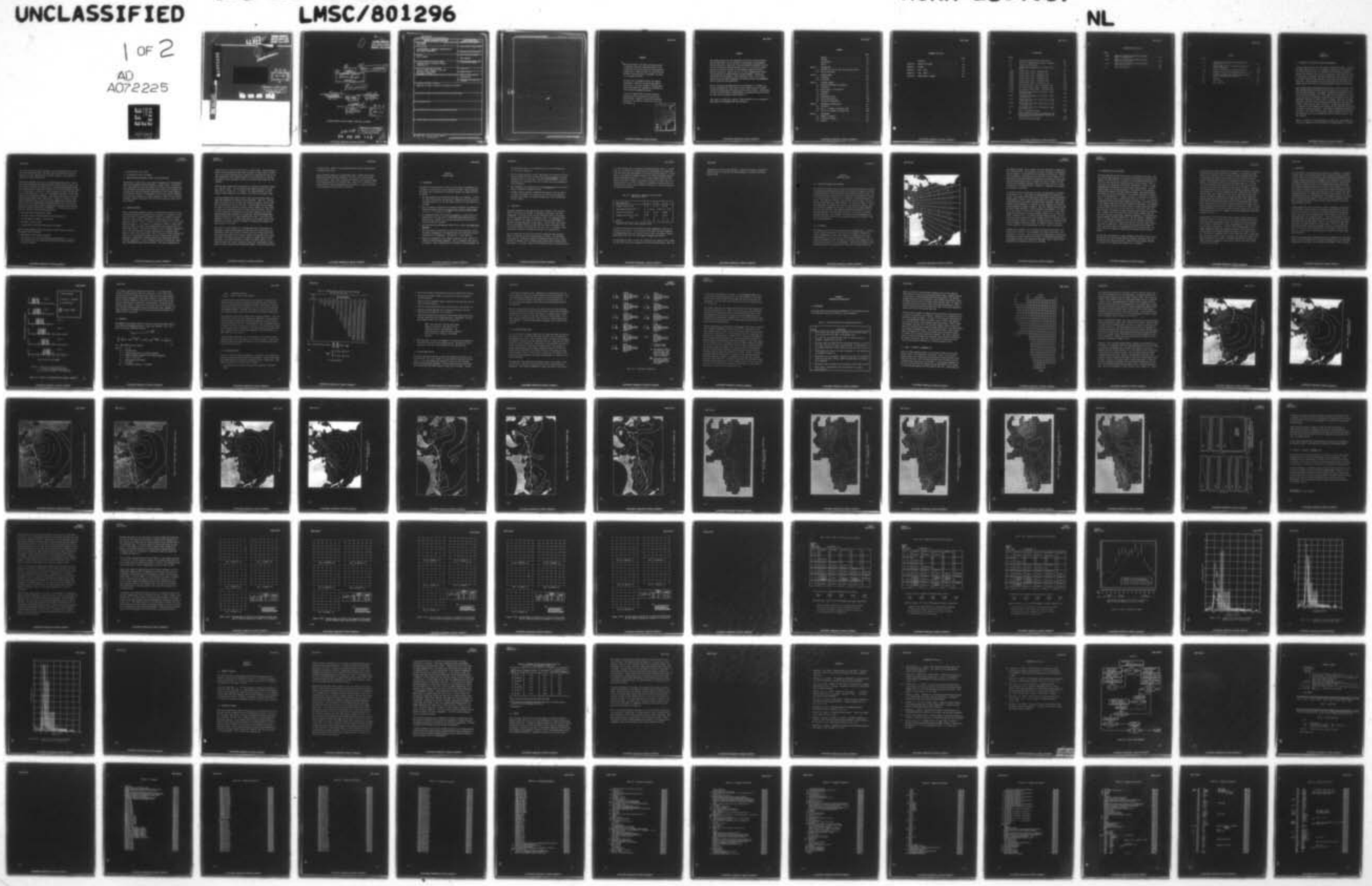

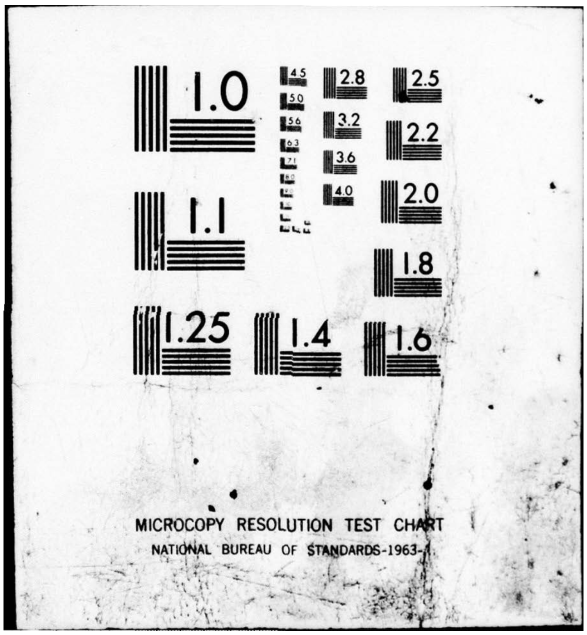
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ABSTRACT

Many applications of wind-wave forecasting require a completely objective, high-speed method of forecasting wave spectra for large areas simultaneously. Consequently, a numerical model for forecasting wave spectral fields was defined, programmed, and tested in two sample situations.

The model uses the Neumann spectrum with angular dispersion as defined by the Stereo Wave Observation Project. The usual problems in defining fetch shapes and motions are eliminated by consideration of an equivalent Lagrangian duration.

In both test computations the method adequately forecasts the rise in significant height as the winds increase. However, the spectral frequencies forecast are too high and the swell does not decay fast enough.

FOREWORD

This research began under the sponsorship of the Office of Naval Research, Contract NOnr 285(03) in the Department of Meteorology and Oceanography, New York University. Some machine time and programming assistance was provided by the Numerical Weather Prediction Unit of U. S. Navy Fleet Weather Central which has since become the Fleet Numerical Weather Facility at Monterey, California. Machine time for the final programming and running was provided by the Lockheed Missiles and Space Company, a Division of Lockheed Aircraft Corporation, under Contract Nord 17017. All of these organizations, and people responsible for machine operation and programming, deserve recognition and appreciation.

Special recognition and appreciation are due Professor W. J. Pierson, Jr., who has encouraged this effort from its very inception and who has helped immeasurably through many discussions, letters, and criticisms. Appreciation is also accorded to Messers. Lionel Moskowitz and Masashi Murakami who scaled the winds from the synoptic charts for Case II.

This report is essentially a copy of a thesis submitted to the Department of Meteorology and Oceanography New York University.

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Chapter 1
INTRODUCTION

1-1 IMPORTANCE OF AND NEED FOR OCEAN WAVE FORECASTING

Accurate large-scale ocean wave forecasting is extremely important. High seas can damage large ships and be a real danger to smaller ones. Seaplanes can only land in relatively low seas. Hydrofoils and surface effect machines (ground effect machine) cannot operate in rough seas. Waves often force ships to change speed and heading. The design of ships and shore facilities, such as sea walls and docks, must consider the forces that are exerted by the extreme waves. Wave forecasting can allow ship operators to plan ahead, thus saving time and money, while also decreasing danger, damage, and discomfort.

There are many military applications in which wave forecasts are useful. Besides needing forecasts for problems that are similar to the commercial uses, there are many other needs. For example, rendezvous for refueling or transferring of men or equipment have a double need for wave forecasts. The speed of the ship toward the rendezvous is affected by sea conditions, then, at the rendezvous, high seas can hinder or halt the transfer. Waves are of critical importance to aircraft carrier operations because high seas cause large ship motions in which airplanes cannot land safely. Surface waves are important to submarines and anti-submarine crews because the noise generated by the waves can provide a perfect hiding place. Such things as antennas and snorkels can be hidden in the clutter on radar screens. The sea condition is one of the most important and critical environmental factors in almost any naval or marine operation.

Since it is difficult to make measurements of ocean waves, hindcasting techniques allow computation of wave statistics for design purposes. In order to

solve these and other practical problems, the entire spectrum of the sea and swell must be known and used. The reasons for this are now fairly well accepted and are also explained from a practical viewpoint by D.M. Aspinwall (Reference 1, 1960), among others.

Another more important, more basic, and longer-range problem exists. This is the problem of advancing our knowledge of how the wind transfers energy to the water and how different wave trains interact to transfer and dissipate energy. This problem has been studied most recently by O.M. Phillips (Reference 2, 1961), L.J. Tick (Reference 3, 1961), W.J. Pierson (Reference 4, 1961), O.M. Phillips and E.J. Katz (Reference 5, 1961), and K. Hasselmann (Reference 6, 1960), among others, from the theoretical viewpoint. Many others have attacked the air-sea boundary layer problems, such as wind stress. However, no one has yet established an empirical model by which this energy exchange can be studied objectively. Only by the establishment of objective models, such as the one proposed here, can the future theoretical approaches be verified (as yet none has reached the stage of readiness for verification). It is also hoped that this model will help with such theoretical problems as:

1. The interaction of opposing wave trains.
2. The proper fetch or duration needed for "full development."
3. The true shape (or shapes) of the spectrum.
4. The effect of wind on swell.
5. The importance of non-linear effects such as breakers.

Some of the more important practical problems in which a model, such as the one proposed, would be helpful:

1. Hindcasting of wave spectral statistics.
2. Hindcasting to learn the area distribution characteristics, i.e., the joint probability of sea conditions occurring with different intensities at several locations.

3. Forecasting for ship routing.
4. Forecasting for naval development.
5. Improving present graphical methods of wave forecasting.

Verification of a model such as this cannot be complete until two-dimensional spectra are available for waves measured on a synoptic basis. In the meantime, rough verification has been carried out, first, with the estimated significant heights from synoptic observations and, second, with the spectra of a particularly severe sea condition recorded by the O.W.S. Weather Reporter. If the National Institute of Oceanography in Great Britain had not developed ship-borne wave recorders (M.J. Tucker, Reference 7, 1956) and used them for systematic synoptic observations, even this much verification could not have been attempted.

1-2 PRESENT TECHNIQUES

Most of the important graphical methods of forecasting wave spectra were summarized and discussed by G. Neumann and W.J. Pierson, Jr. (Reference 8, 1957). Since that time, J. Darbyshire (Reference 9, 1959) has modified his method, and the C.L. Bretschneider (Reference 10, 1959) and the "Densites Spectro-Angulaires" (DSA) of R. Gelci, H. Cazale, J. Vassal (Reference 11, 1957) methods have been proposed. W.J. Pierson, Jr. (Reference 12, 1959), H. Walden (Reference 13, 1961), and others have compared several forecasting methods with inconclusive results. (See also W.J. Pierson, Jr. and G. Neumann, Reference 14, 1961). With the exception of a recent application by J. Darbyshire (Reference 15, 1961) and a third model of DSA (R. Gelci and P. Chavy, Reference 16, 1961), all of these methods are useful only for a limited number of points. Darbyshire, in opposition to others, maintains that duration and fetch are relatively unimportant. He can, therefore, easily use his method for computing a two-dimensional map of wave conditions. This work by Darbyshire was

carried out while the present study was in its final stages. The DSA numerical method, which is presently being studied in France, is quite similar in principle to the methods described herein, except for the simplification that the energy increment for each frequency component which is added does not depend on the complete initial spectrum, but only on the initial energy within the same component.

There has been a great deal of controversy as to which of the proposed theoretical spectra is best. No one method has been definitely proven to be best. Since the W.J. Pierson, Jr. - G. Neumann - R.W. James (Reference 17, 1955) method is widely accepted in this country, it was used in the present study.

The Pierson-Neumann-James system and most other wave forecasting methods use three basic parameters to forecast the sea conditions. These are: the wind speed, the area over which the high winds are fairly constant, called "fetch", and the time duration that the wind blows. Earlier methods did not consider the width of the fetch important; however, Pierson, Neumann, and James showed a necessity for measuring this width to define the swell filters. These filters are a simple way of keeping up with the energy content in the various frequency-directional increments in the spectrum. The Pierson-Neumann-James system was extended by L.S. Simpson (Reference 18, 1955) to allow for some movements of the fetch. He showed large effects on wave height caused by the movement of the fetches; however, the method is laborious and considers only simple motions of the fetch.

Since there is a great demand for a two-dimensional map of ocean waves, the techniques of Pierson-Neumann-James have been used by the United States Navy Hydrographic office and by others to forecast sea waves for many points from which plotted map contours can be drawn. However, in doing this work by hand, the volume of the work usually forces the analyst to neglect swell and other fine points. W.E. Hubert (Reference 19, 1957) has used an IBM 704; the co-cumulative spectra of Pierson, Neumann and James, and a large number of grid points, to make a forecast map of significant heights. He had also been forced

to neglect swell. Neither of these mapping methods considers moving fetches of changing wind fields.

Another difficult problem is in delineating a fetch. In most actual cases a fetch does not have clear-cut boundaries. The wind is not really constant within the fetch. Also, there is some finite transition zone around the edges. Two independent analysts will seldom define the same fetch. Therefore, in devising a method to make two-dimensional wave forecasts, it would be convenient if the measurement of fetch could be eliminated.

Chapter 2
PHYSICAL MODEL

2-1 ASSUMPTIONS

The method of forecasting used is based on certain physical assumptions that are similar to those used by Pierson, Neumann, and James. These assumptions are listed, with the differences from Pierson, Neumann, and James underlined, as follows:

1. The wind generates the wave spectrum from high to low frequency. If there is a gap in the spectrum, this gap must be completely filled, starting at the high frequency end of the gap, before the rest of the spectrum will be developed.
2. The wind generates component waves according to Neumann's wave-generation graphs with angular dispersion <u>as given by the results of Project SWOP,</u> L.J. Cote et al, (Reference 20, 1960).
3. The annemometer-height wind velocity <u>at a point</u> in time and space is representative of the wind within a finite area surrounding the point in space and time. Further, in a practical application, this wind can be found with sufficient accuracy.
4. Wave conditions are approximately constant over a finite area <u>around each gridpoint.</u>
5. The linear theory of water waves in infinitely deep water holds, so that the speed of propagation of the component waves is a function of only the frequencies of the components. This implies a "linear" spectrum.
6. There is no dissipation of wave energy in deep water, also, there is no transfer of energy between components. Thus, for example, cross seas do not interact. These assumptions are not necessary to the development, but

follow Neumann because no relationships have yet been established that can be used with confidence.

7. The total energy increase in a unit time interval is a function of (a) the initial energy of the waves already moving within ±90 degrees to the wind direction and (b) the wind speed. This particular assumption is also not necessary to the development and could be revised when the relationship is better understood.

8. Wave components, once generated, move along approximate great circle paths without spreading or changing direction.

9. Although turbulent pressure and momentum fluctuations in the air next to the surface are thought to be important, these and any other important parameters are assumed to be directly proportional to the "surface wind velocity" always.

2-2 DESCRIPTION

The system developed in this paper permits one to dispense with an Eulerian Fetch if the duration is measured in "Lagrangian" coordinates. The term "Lagrangian" is used here to mean that the coordinates used in the forecast move with the group velocity of the component waves. The "Lagrangian" duration is, therefore, the length of time that the wind is adding energy to a particular moving energy packet or wave group. In other words, the distance that the coordinates themselves travel while the waves are growing is equal to the fetch distance if the fetch does not move. This is, therefore, a generalization of Simpson's (Reference 18) analysis for a moving fetch.

Thus, the speed with which the waves will move through the fetch actually limits the time that the wind can add energy to the waves. The same effect can be shown in a rough way by using the co-cumulative spectra (CCS), curves, developed by Neumann, and the integrated group velocity from classical linear wave theory: $R = t/0.66f$. Where R is the distance of travel in nautical miles,

t is time in hours, and f is frequency (reciprocal period) in $sec.^{-1}$. To show this, one can calculate the distance that the leading edge of the energy will move in a finite time from Neumann's CCS curves as shown in Table 2-1. In this table, a very rough time-weighted average of the minimum frequencies was prepared by averaging the values of f at five points equally spaced in time. This has been used to compute an equivalent fetch which is quite close to the empirical value for the fetch. Neumann went through an equivalent process in establishing his curves, and O.M. Phillips (Reference 21, 1958), has described the process theoretically.

Table 2-1 Comparison of Lagrangian Travel Distance With Eulerian Fetch

Wind Speed (kts)	30	40	50
Minimum Duration (hrs)	23	42	69
Time-meaned Frequency* (sec^{-1})	0.1270	0.0857	0.0705
Distance Traveled (nm)	274	742	1483
Minimum Fetch From CCS Curves (nm)	280	711	1420
% Error	2.1	4.4	4.4

*Average of five points equally spaced in time.

It should be stressed that no assumption was made regarding the shape or consistency of any "fetch". This is because in this model the actual irregular and changing wind field as a function of time is used. The method of specification alone limits the area and temporal irregularities allowed.

By considering the above, a method for allowing the wave groups to move through the wind field at their own propagation velocities has been devised. Thus, the

measurement of fetch has been eliminated. Instead, the energy is transferred from the wind to the waves and the waves propagate in accordance with hydrodynamic theory.

Chapter 3
COMPUTING SCHEME

3-1 COMPUTING PHILOSOPHY AND EQUIPMENT

The section describing the physical model was purposely kept very brief because the usefulness and complexity of models of this nature must depend on available computing facilities. This problem was first attempted in 1958 with only a set of tables describing the spectrum and the intention of using graphical addition on a series of charts. Each chart was to represent a particular spectral component. This might have answered a few questions about the model, but could not have helped prepare for future advances. The volume and length of the work was already near the maximum that a person can be expected to perform. Thus, it was decided to program the problem for a large-scale electronic computer. The model has, therefore, been modified slightly by characteristics of the available computer. The scheme described here is that used on an IBM 7090 having 32,768 words of core storage. The problem was also programmed for an IBM 704, having 8,192 words of core storage plus drums, and a CDC 1604. Each was slightly different.

3-2 COORDINATES

The coordinate system must be described before proceeding further. A grid for the area spacing and individual time steps for the temporal coordinate was chosen as approximately square with 2 degrees of latitude on a side, and a time increment of two hours. The grid used is shown in Figure 3-1. These choices are consistent, since the motion of the fastest wave component is such that it will not travel to the next gridpoint. Implicit in the choice of this coordinate system is that forecasts will not be more accurate in space than

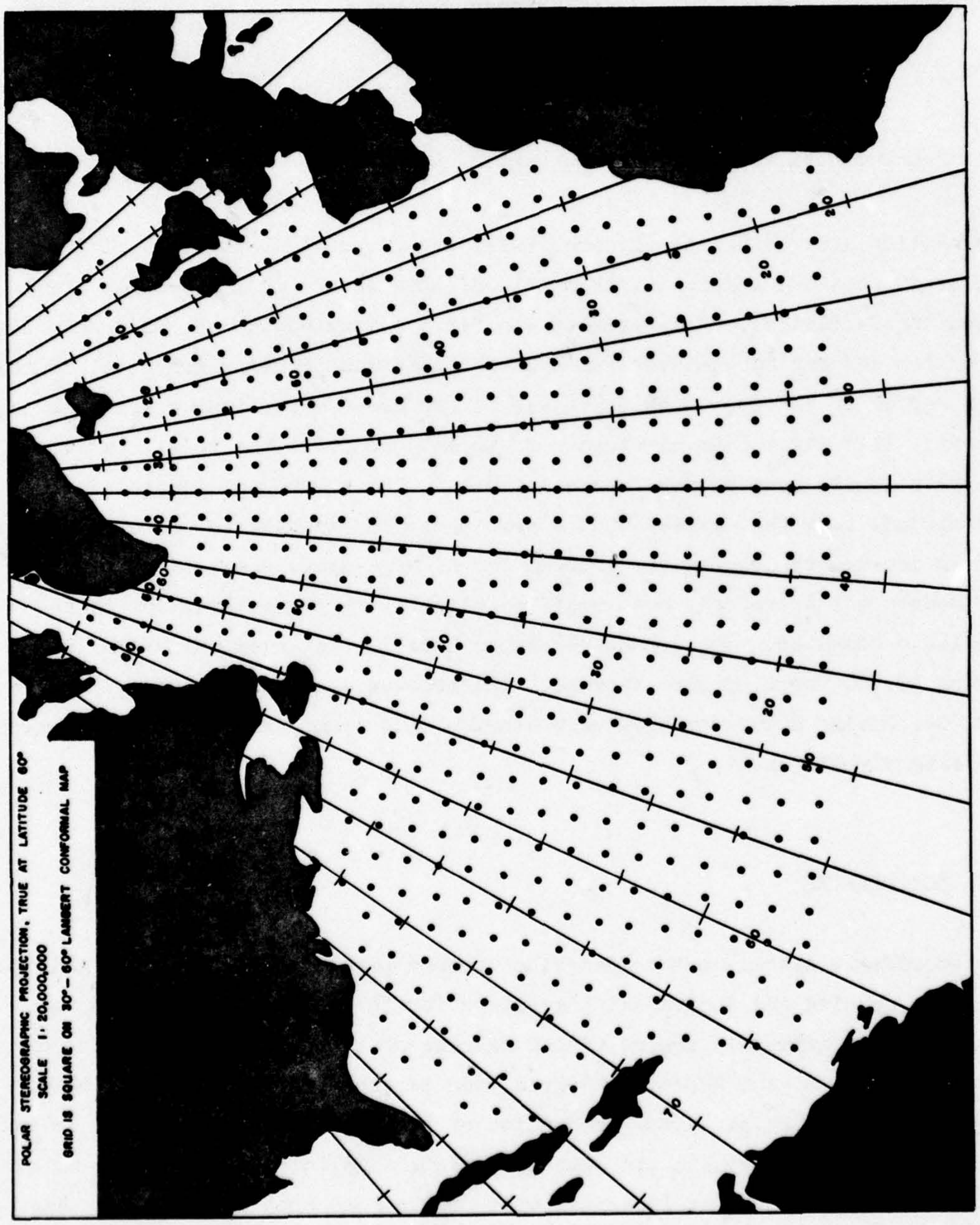

Figure 3-1 Grid Used to Specify Wind and Wave Fields

the gridpoint spacing. Ways to improve this were considered too complicated for a first model, but are discussed at the end of this paper. This spacing was also chosen to be consistent with the accuracy of wind reports. Wind reports, in general, are available only at six or twelve-hour increments; and the location of the reporting ship, allowing for an equivalent distance error instead of observational error, is normally less than two degrees latitude. The location of important phenomena, such as cold fronts, however, is often no better than two degrees latitude. Therefore, a compromise on two degrees and two hours is reasonable.

It was stated that the chosen grid was square and approximately two degrees of latitude on a side. The reasons for approximating deserve further discussion. Since waves travel along a great circle path, a Gnomonic projection would probably be useful. Since this projection is not equal in area, location effects must be considered, causing a further complexity. Wave trains leaving from one gridpoint at a direction of, say, 30 degrees will arrive at another gridpoint at perhaps 43 degrees. Thus, the computing system must keep up with all these variations. Because the model, as programmed, uses almost all of the capacity of the available computers, because this is only a first approximation and because the present program considers only the middle latitudes, a compromise on 30 - 60 Lambert Conformal mapping was made. On this projection, great circles are not quite straight, but for the purposes of this study, they can be treated as straight. In middle latitudes a location accuracy of only ±2 degrees latitude is claimed. The Lambert projection also has a variable spacing of the latitudinal grid, but this is only a minor effect.

The grid used is treated as if all squares were exactly the same size. All directions are referred to the coordinates of the grid rather than to the coordinates of the Earth. Thus, the waves follow approximately a great circle by moving in a constant direction on the grid. No consideration was given to the divergence caused by the curvature of the Earth. Ways to improve these assumptions are considered at the end of this report.

3-3 SPECIFICATION OF THE SPECTRUM

The second decision that must be made lies in specifying the spectrum. There are at least three possible ways to specify the spectrum in the memory of the machine. The first would be to remember all of the generating conditions in such a way that they would be carried along with the wave trains. This is, effectively, the method used for graphical computations. However, it seemed cumbersome when considering over 500 grid points simultaneously. A second approach might be to fit some polynomial to the spectrum at each gridpoint which would be changed as the wave conditions change. This approach appears much better but was not used because it is relatively complicated in comparison to the third approach. It should, certainly, be considered for future attempts. Instead, a simple, straightforward technique was used. Ten frequency-increments and twelve directional-increments were chosen. The numerical value of the energy within each of these 120 increments is remembered. The midpoints of the frequency intervals were finally chosen as having equidistantly spaced periods of 2.85, 5.31, 7.77, 10.23, 12.69, 15.15, 17.61, 20.07, 22.53, and 25.00 seconds. The reasons for using constant period increments are explained later. Several other values were tried, but the above increments gave the best results without using refined integration techniques. In accordance with Pierson, Neumann, and James (Reference 17) and O.M. Phillips (Reference 27, 1961), it is especially important to have very high frequencies specified. This is because energy is added much more slowly to very small high frequency waves than to larger waves. Since these high frequency waves propagate so slowly, and because there is no dissipative force in the present model, the model ocean can be expected to become filled with high frequency wave components.

The directions were chosen in 30 degree increments (± 15 degrees) because it was believed that the wave directions should be somewhat less accurate than the directions of the winds causing them. Surface winds are normally specified to 16 points of the compass (22.5 degrees) or to 10 degrees.

As stated above, discrete increments have been chosen to represent the spectrum. This causes certain errors that must be considered. After many time steps, swell will be separated so that no energy is at some intermediate grid point. In other words, the longer, faster waves will outrun the waves of the next discrete frequency band by more than the distance to the next grid point. For example, in the extreme case with a spectrum having energy at $f = 0.04$ and $f = 0.06$ the increments would separate at the rate of 0.19 spaces per time step and would be two spaces apart after about eleven time steps. Similarly, the discrete directions will keep energy from reaching intermediate grid points after moving only to the third diagonal grid point, which could be as rapid as six time steps. Even though these errors may be significant in some cases, they are not nearly as important in the practical case because fetches are normally larger than one grid point in length and width. With longer fetches these vacant intermediate grid points are filled from adjoining areas of the fetch. Since this does not allow the energy to spread out but keeps it concentrated along a given path and at a particular frequency, the model is biased toward higher swells. In the case of small classical fetches, this bias would cause the forecast field to be irregular with adjacent grid points being either too high or too low.

Specification of a map of the final forecast spectra is harder than that of the initial spectra. To present 120 values at each of 519 grid points would confuse the reader through mere volume. Area effects would not be apparent. It is, however, a simple matter to print any parameters of interest because all values are in the machine. It would be easy to present maps of total energy, significant height, most important direction, lowest frequency, frequency having the most energy, frequency and height of the largest swells, etc. The problem is presently, there is little data with which to verify these maps, and no use for most of them. Therefore, only significant height is presented in map form in this report. The complete spectra for selected grid points are printed separately. More detail on this is given in the section on results of this report.

3-4 PROPAGATION

This model depends upon allowing the wave energy to be propagated. Originally, a system similar to the Jacobian method, used in numerical weather prediction, was tried. This first system effectively took a gradient and multiplied it by a speed, although what was really programmed was an interpolation of the energy a distance upstream depending on the component group velocity. This does not work because in each future time step the energy spreads further and further as illustrated schematically by the solid vertical lines in Figure 3-2. Note, for instance, that these vertical lines decrease in amplitude during each time step, and new lines form further and further away from the hatched area, which is where they should be. Higher order interpolation does not help. The correct method must allow for discontinuities. These sharp changes are, of course, often observed with the passage of a cold front and with the onset of swell. This is a major difference between the present effort and that of Gelci and Chavy (Reference 16, 1961).

A simple approach was used to establish a method of propagation, though others can be devised with more accuracy. In principle, what was done was to keep track of how far past and to the side of an average grid point the wave components were, then when the component had moved far enough to reach the adjacent grid point, the energy was "jumped". Since the grid system, in use, is only approximate, this was simplified by keeping only one record for each component for all of the grid points, because at all grid points the same component moves in the same direction at the same speed. Thus, if it takes, say, three time steps for a particular component to travel to the adjacent grid point on every third step, the entire field will be jumped. That is to say the energy from grid point upstream replaces the energy at the adjacent grid point downstream.

Because of the grid shape, north-south and east-west components are very simple. However, in other directions it is necessary to remember how far the wave component exists to the sides as well as forward and backward. Here, the choice

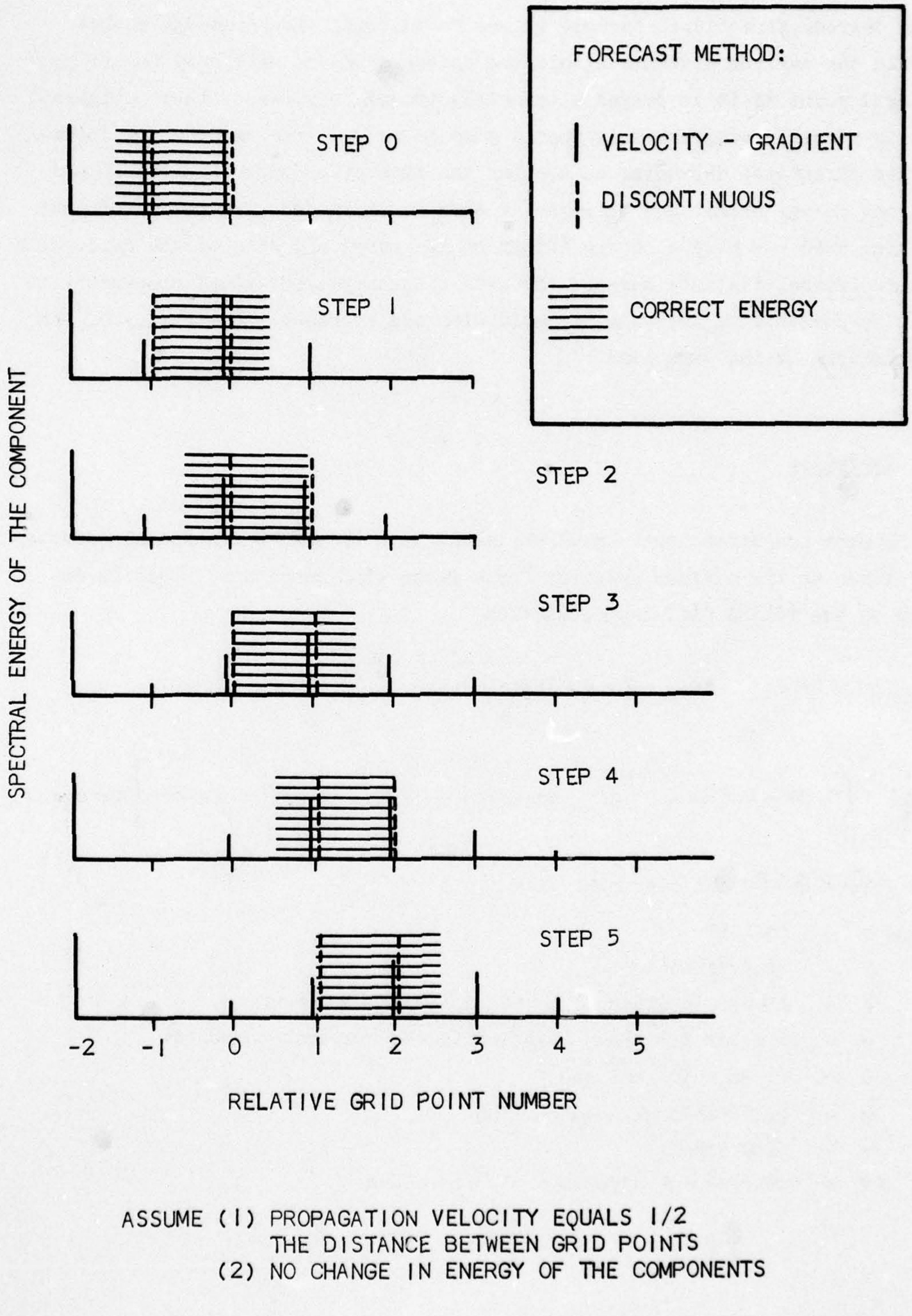

Figure 3-2 Results of Propagating Wave Energy, Schematic

of 30 degrees directional increments was fortuitous. If an energy pocket travels the maximum distance within the chosen grid, it will only be off by one grid point if it is jumped alternately toward, say, West, then Southwest. What is actually programmed is that a jump is made in the cardinal or intermediate direction, depending on whether the time step number is even or odd when the energy packet has traveled an average distance. The method of propagation used can have a strong effect on the shape and size of the grid. With four individual distance markers for each frequency-directional component, it might be possible to increase the grid size and increase the accuracy of the computations at the same time.

3-5 EQUATIONS

The Neumann non-directional spectrum, along with the SWOP directional effects, were taken as the maximum spectrum for a given wind condition. This is defined as the finite difference equation:

$$\Delta E_{max}(\omega, \theta) = c\omega^{-6} e^{-2\left(\frac{g}{\omega v}\right)^2} \cdot$$

$$\left[1 + \left(0.50 + 0.82 e^{-1/2\left(\frac{\omega v}{g}\right)^4} \cos 2\alpha\right) + 0.32 e^{-1/2\left(\frac{\omega v}{g}\right)^4} \cos 4\alpha\right] \Delta\alpha\, \Delta\omega \qquad (1)$$

for $-\frac{\pi}{2} < \alpha < \frac{\pi}{2}$ and zero otherwise.

where α = $(\theta - \phi)$

ϕ = wind direction

θ = direction attached to the spectral component

ω = angular frequency attached to the spectral component

c = $1.528 \times 10^4 \text{ cm}^2 \text{ sec}^{-5}$

g = gravitational acceleration

v = wind speed

$\Delta\alpha$ = incremental direction = $\pi/6$ radians

$\Delta\omega$ = incremental frequency

ΔE_{max} = maximum energy in the increment.

The growth function from the CCS curves is also needed. No simple curve could be fitted, so this was tabulated as presented in Table 3-1 and used with linear interpolation for intermediate values. These values were read directly from the CCS curves presented in H.O. 603 for two hour increments, then smoothed slightly. Note that the increase in energy in each two hour time increment depends on both the wind speed and the initial energy state.

The definition of this initial energy state was made arbitrarily. To be consistent with the CCS curves for constant wind conditions, it was decided to find this initial total energy by adding all components within ±90 degrees from the direction of the wind. The consequences of this assumption are that long swell is added in the same way as local sea. This means that when swell is present with a similar direction, the sea will build up faster than otherwise. Another effect is that the more changeable the wind direction, the more slowly the waves will grow.

Instead of these assumptions, the second parameter of the growth function table could have been a mean frequency or an upper frequency. In this case, some more complicated assumptions would have been required regarding swell and wind direction changes.

3-6 COMPUTATIONAL STEPS

With all of the above methods, assumptions, and equations, it is possible to present the major individual steps of the computation. A master flow diagram and program listing are presented in Appendices A and B, respectively. These steps are repeated for each time step, as follows:

1. Given initial spectrum specified by the 120 components at each grid point.

Table 3-1 Energy Growth in $Feet^2$ of the Wave Spectrum Per Two Hour Time Step

*E_o (ft^2)	Wind Speed Knots 10	14	18	22	26	30	34	38	44	50	56
0	0.1	0.15	0.2	0.35	0.5	0.7	1.0	1.5	2.0	3.1	4.5
1	0.0	0.6	1.7	1.8	2.0	2.5	3.0	3.5	4.0	5.3	7.0
5		0.0	0.0	3.2	3.4	3.8	4.0	4.5	6.0	8.7	12.0
10				2.0	4.4	4.5	4.5	5.0	7.5	11.0	15.0
15				0.0	5.0	5.0	5.0	5.4	8.0	12.0	17.0
20					5.0	5.5	6.0	6.4	9.0	13.0	20.0
25					4.5	5.9	6.4	6.9	9.4	14.0	23.0
30					0.0	6.6	7.0	8.0	10.0	15.0	25.0
35						7.7	8.0	9.0	10.4	16.0	25.0
40						8.7	9.1	9.8	10.7	17.0	25.0
45						9.0	10.0	10.5	11.0	17.5	25.0
50						7.0	11.0	11.0	11.4	18.0	25.0
60						0.0	12.0	12.0	12.0	18.5	25.0
70							12.0	12.4	12.4	19.0	25.0
80							12.0	12.6	12.8	20.0	25.0
90							11.0	12.9	13.2	21.0	25.0
100							10.0	13.2	13.8	22.0	25.0
115							0.0	13.5	14.2	23.0	25.0
130								14.0	15.0	24.0	25.0
145								14.0	15.8	25.0	25.0
160								13.0	17.0	25.0	25.0
175								10.0	20.0	25.0	25.0
200								0.0	23.0	25.0	25.0
250									25.0	25.0	25.0
400									25.0	25.0	25.0

$$*E_o = \text{initial spectral energy} = \sum_{f=1}^{10} \sum_{\theta=1}^{12} \Delta E_{f\theta} \cdot \delta_{\theta\phi}$$

where

$$\delta_{\theta\phi} = \begin{cases} 1 \text{ for } \left| \theta - \phi \right| \leq 90^\circ \\ 0 \text{ for } \left| \theta - \phi \right| > 90^\circ \end{cases}$$

ϕ = wind direction

2. Given wind velocity at each grid point for the succeeding time interval.
3. Sum the total spectral energy at each grid point within ±90 degrees of the wind direction.
4. Look up the total allowable change in energy for each grid point from the growth function tabulation.
5. Find the maximum possible spectrum at each grid point from equation (1).
6. Compare the initial spectrum with the maximum spectrum for each grid point and note any gaps that can be filled in.
7. Spread the available growth energy into the available gaps starting with the high frequencies first for each grid point. Secondarily, the directions nearest to that of the wind are to be used first.

   NOTE: This procedure finds the total energy growth to be expected, then splits it into component directions and frequencies. The method carefully includes any higher frequencies which may have been missing in the initial spectrum.

8. The final step is to allow each component of the spectrum to propagate in its own direction and at its own group velocity. The spectrum at each grid point is then the initial condition for the next time step.

3-7 INITIAL SPECIFICATION

In order to specify the spectrum for the initial conditions properly in the first time step, 120 x 519 = 62,280 ΔE values should be read into the computer. If all these numbers were available on maps, the task of scaling them off would be almost impossible. However, present spectral observations are so sparse that the initial spectral fields are not available. Instead,

a very rough first guess is used. Estimates of the significant height and earlier winds are used to get a rough estimate of the initial spectrum. This is accomplished by assuming for each grid point that the previous wind (at $t = -1$) had been constant long enough to raise the specified sea. If the wind was not high enough to raise the sea, the excess spectral energy was discarded.

There are so many errors in this process that they are not worth detailing. However, after many time steps, all of this initial energy will be dissipated or masked by the effects of later winds making the remaining errors insignificant. Thus, the first few time steps cannot give correct answers. This means that any forecast must begin with a hindcast to find the present spectral conditions. Present limited experience suggests about one day for this hindcast.

3-8 ILLUSTRATIVE COMPUTATION

In order to see how the model behaves with this computing scheme an artificial test case was run. The initial significant height to start the computation was assumed to be 20 feet. Then, a constant wind of 47 knots from 270 degrees was allowed to blow over only this same grid point for 9 time steps (18 hours) as well as for the initial step. The results of this experiment are shown in Figure 3-3 along with a tenth time step having no wind. For comparison, a 47 knot wind can generate waves having a significant height of 67 feet for infinite fetch and duration. For fetches of 120 nm, the significant height should be about 21 feet. It should also be pointed out that because of nonlinear growth characteristics, the final forecast height is a function of the initial conditions.

This impossible case illustrates the possible accuracy of the model by showing the "minor" variations resulting from the discrete and discontinuous assumptions. When energy is propagated by jumps, the energy at the location

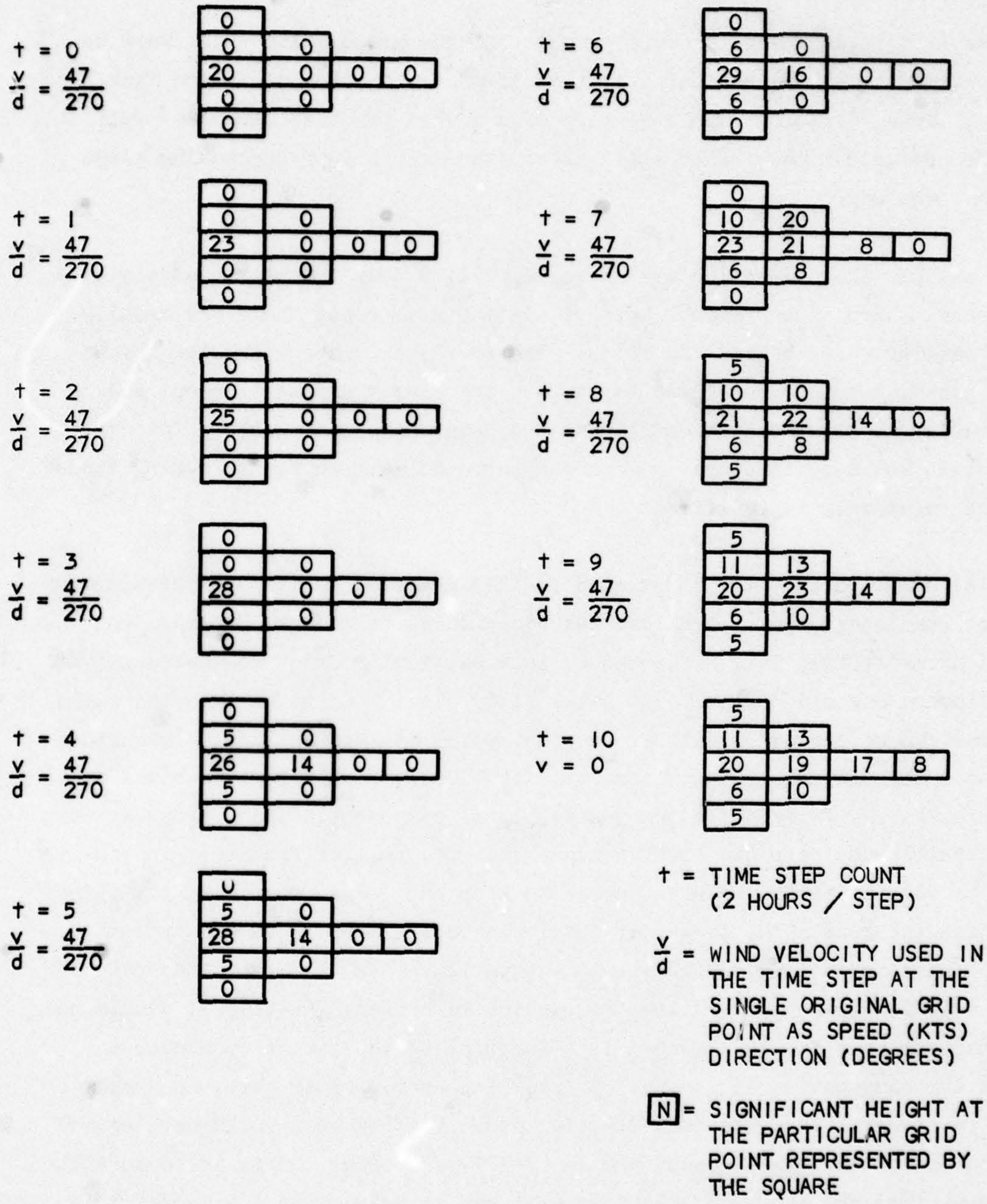

Figure 3-3. Illustrative Computation

it has left is decreased and vice-versa. If the propagation phase were to be carried out at the beginning of each time step instead of as the final phase, these variations would be more masked when the seas were near full development. But they would still affect the accuracy of succeeding steps in the same way.

This example shows what the system would predict near the rear boundary of a classical sharp edged fetch. However, in the real case, there are usually some smaller waves behind the fetch. The energy from these smaller waves also propagates into the fetch to replace the energy propagating out and decreasing the irregularities illustrated here. Also, any grid point within the fetch would receive energy from the surrounding grid points making these errors relatively insignificant.

Several other points are illustrated in this example. Note that the spectrum is not completely symmetrical because odd amounts of energy have not been split symmetrically but, rather, used in a particular order so that a slight bias toward one side exists. If later study shows this to be important, the program can be corrected easily. Another point of interest is the magnitude of the swell increments that move out. They are governed by the amount of spectral energy in each frequency-directional component. Thus, since spectra have their peaks near the low frequency cut off, smaller frequency increments must be used in the lower frequencies to keep the jumps from being too large. This was the reason the frequency intervals were chosen to have midpoints spaced at constant period increments. Experience may well show that even more drastic biasing toward low frequencies is better. Lastly, it should be pointed out that the swell shown is a function of the time step number on which the computation was begun. By starting at time step zero, no jumps took place until time step 4. Starting at some other step could have caused the jumps to take place sooner and in a different order. This is because the distance that the energy of the component has traveled past a grid point is treated as a function of the time step count only.

CHAPTER 4
HINDCASTS AND VERIFICATION

4-1 DISCUSSION

To maintain objectivity and mechanize preparation of the required input data for the IBM 7090, rules shown in Table 4-1 were established.

Table 4-1 General Instructions for Preparing Input Data

Item	Description
1	All surface wind speeds used are averages over the square centered at the grid point with sides of 120 nautical miles.
2	At time t=0, the significant wave height at every grid point is needed. Directions are not used.
3	Surface winds are needed from the 6-hourly map previous to t=0 up to at least t=48 hours in 6-hour or shorter steps. If information is available at less than 6-hourly steps, it can be used down to 2 hours.
4	Wind speeds less than 10 kts can be recorded as 0. All omissions are considered the same as 0.
5	Direction is to be recorded in relation to the grid, not true North. The top of the grid is North. These two values will be the same at 35° longitude.
6	Direction from the "North" can be recorded as either "000" or "360".
7	The speed is recorded first, then the direction in 3 digits, (as 27.020.).

Figure 4-1 gives the location number assigned to each of the gridpoints. These numbers are used for specifying the location where a complete spectrum is desired and for many operations internal to the machine. The IBM 7090 program required that the wind speeds or wave heights be punched into standard Hollerith cards with 18 four-place values per punch card. For winds, two four-place numbers are needed to specify each grid point having two values each for only nine grid points on each card. Thus, 58 cards are required to specify the winds at each two-hour time step.

When this study was begun, no adequate ocean wave spectra, from measured waves in severe sea conditions, were available. Therefore, use of synoptic maps of significant height was planned. In order to be as objective as possible, the U. S. Navy Hydrographic Office was asked to choose a severe storm condition and to provide copies of their regular synoptic wave charts. Careful streamline analyses were made of the ten six-hourly synoptic charts, but the wave charts were accepted without change to maintain objectivity. The period chosen was 8 through 10 September 1956. Later, during the course of this research, waves were measured for a severe sea condition during 16 December through 18 December 1959, from which spectra were computed. This case is presented here as a second, and perhaps more meaningful, test of the model established. The synoptic situations, input data, results and verifications of the two cases are presented and discussed in a succeeding separate section.

4-2 CASE I, 8 THROUGH 10 SEPTEMBER 1956

There were three important aspects of the synoptic situation for the North Atlantic Ocean at the beginning of this period. First, a cold front was roughly parallel to the East Coast of North America and had moved 200 to 300 miles into the ocean. This cold front extended from an occlusion and deep cyclone near the southern part of Greenland. On the southern extremity, the front was relatively weak and tending to become stationary with the remains of a hurricane approximately 400 miles ahead of the front. Another deep low

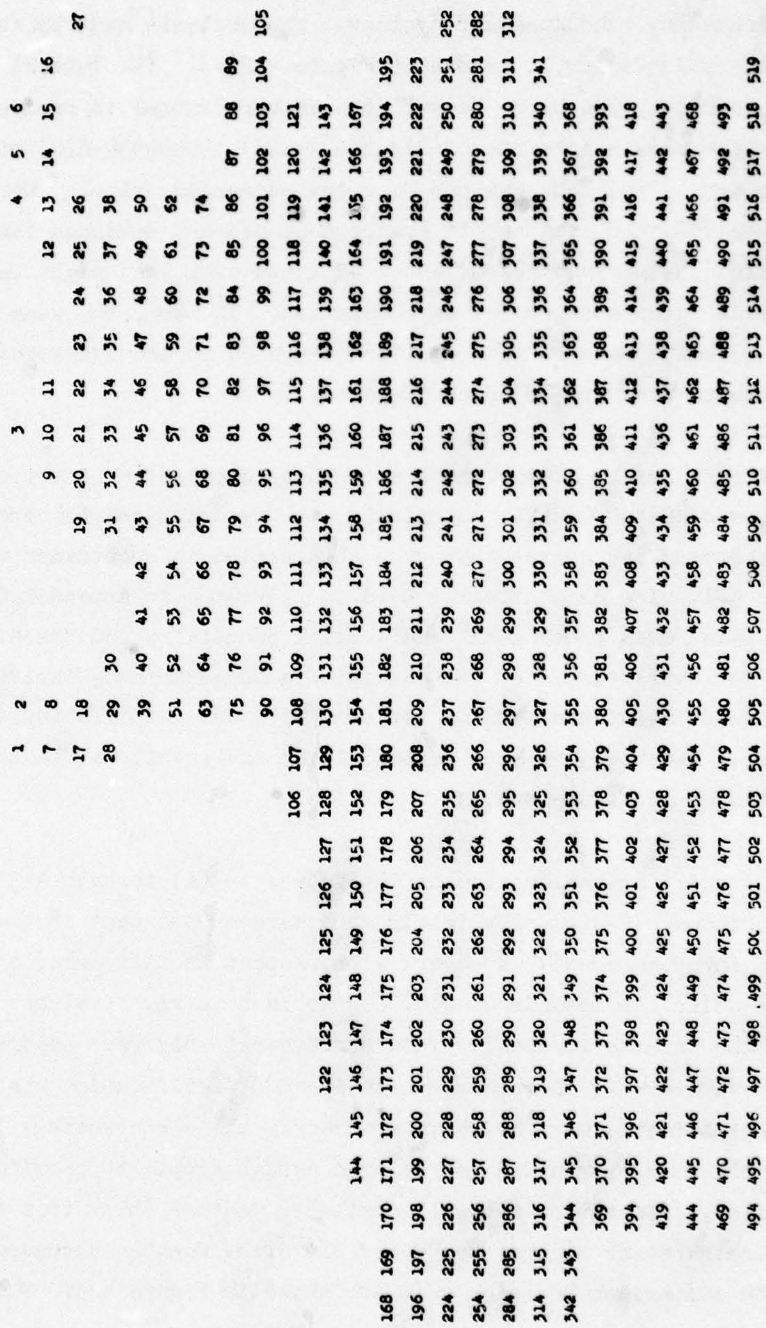

Figure 4-1 Number Location Assigned to the Various Grid Points

was sitting about 500 miles off the coast of France, while the central part of the ocean was dominated by the usual anticyclone. The analysis made by the National Weather Analysis Center, is shown in Figure 4-2(a). The initial sea-condition chart prepared by the U. S. Navy Fleet Weather Central is presented in Figure 4-3(a). The remaining parts of Figures 4-2(a) through 4-2(f) and Figures 4-3(a) through 4-3(c) show analyses for the succeeding times. During these succeeding periods, the cyclone off France deepened and remained fairly stationary, providing northerly winds of about 40 knots over what might be considered a 300 mile fetch and several days duration. In turn, the weak cyclone off Florida became a wave on the front and deepened to provide a complicated moving fetch with wind speeds up to 50 knots.

The initial significant height of the waves at each grid point was interpolated from the initial sea condition chart. Similarly, the synoptic charts were used to prepare surface streamline charts that were then scaled in accordance with the rules of Table 4-1. The data actually used is presented in Appendix C. Hindcasts were prepared from these winds and initial conditions and the significant height field for every time step was tabulated along with many individual spectra. An average of about two minutes per time step was required for the machine computation. However, only the initial field and results at 12-hour intervals are presented in Figure 4-4(a).

Comparison of the significant height fields in Figures 4-3(a) through 4-3(c), and Figures 4-4(a) through 4-4(e) show fairly good agreement except in the high wave area near the European coast. However, with respect to this area, a graphical forecast using the methods of H.O. 603 would have given values close to those found by the machine forecast. This and several ship wave reports confirmed the high wave area. Therefore, an independent verification was attempted using the estimated wave heights recorded by the ocean weather ships. In order to check the wave charts and get a large enough sample to provide a reasonable comparison, information from all available weather ships from the files of the National Weather Records Center of the U. S. Weather Bureau were used. Plots of the comparison for each ship are shown in Figure 4-5. Ship J,

Figure 4-2(a) Surface Chart, 0630Z
8 September 1956

Figure 4-2(b) Surface Chart, 1230Z
8 September 1956

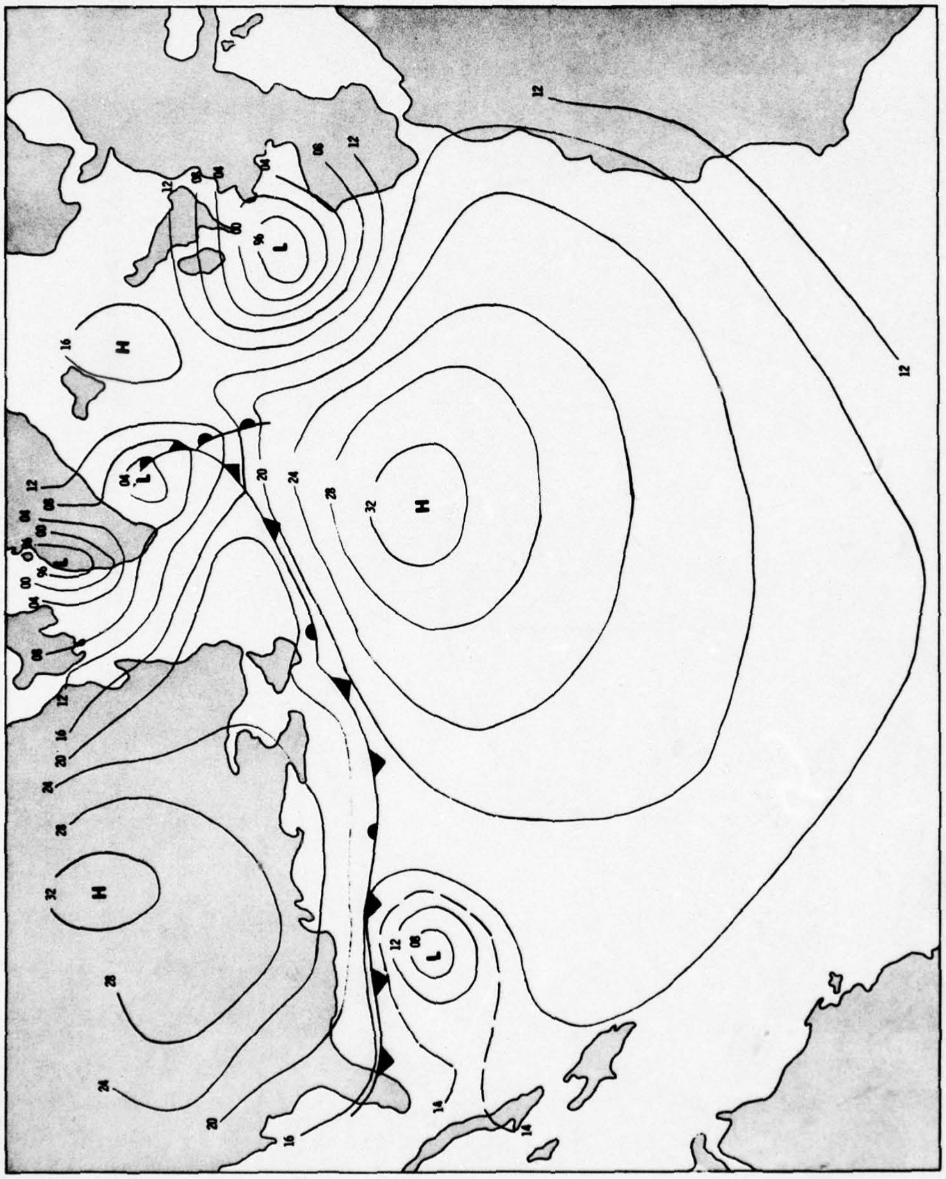

Figure 4-2(c) Surface Chart, 0030Z 9 September 1956

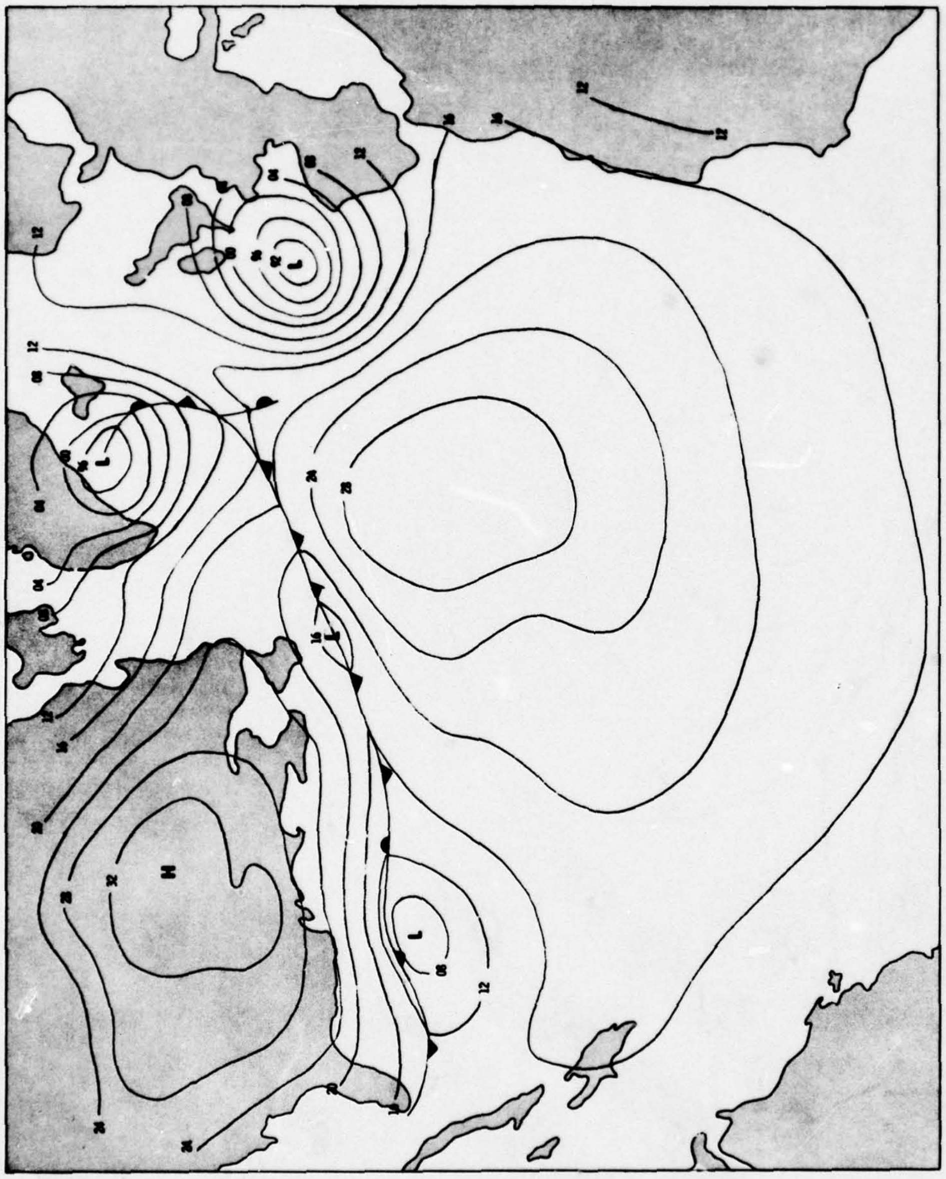

Figure 4-2(d) Surface Chart, 1230Z 9 September 1956

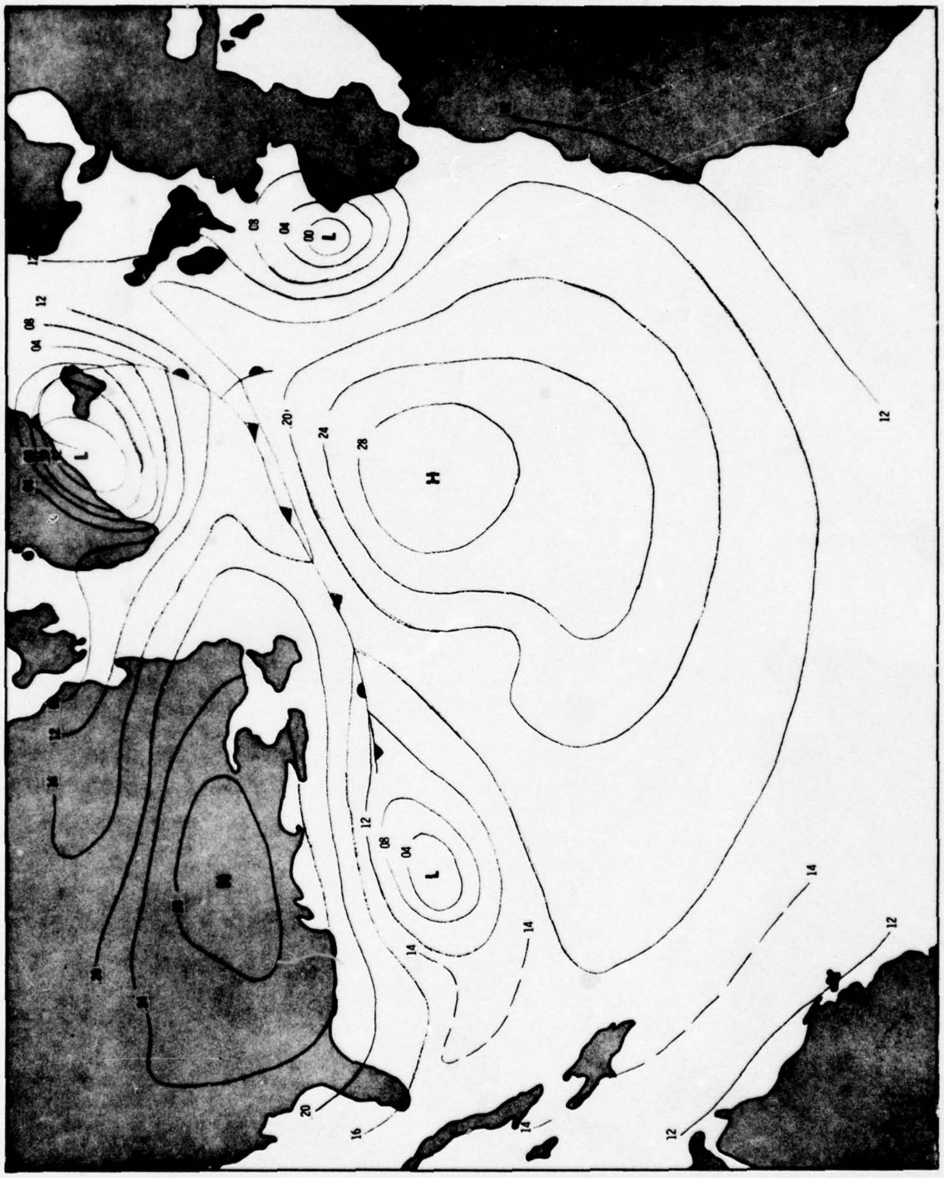

Figure 4-2(e) Surface Chart, 0030Z
10 September 1956

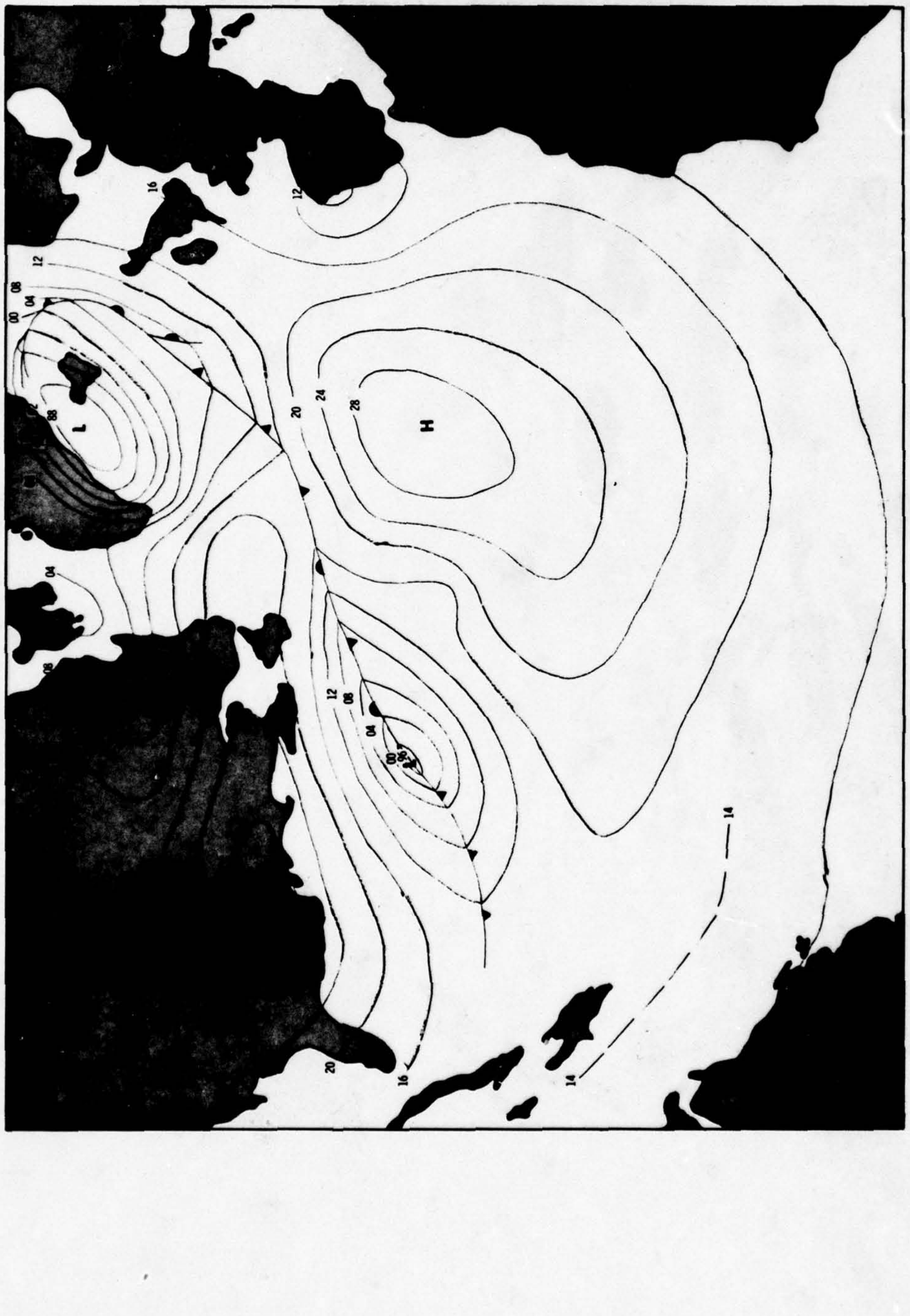

Figure 4-2(f) Surface Chart, 1230Z
10 September 1956

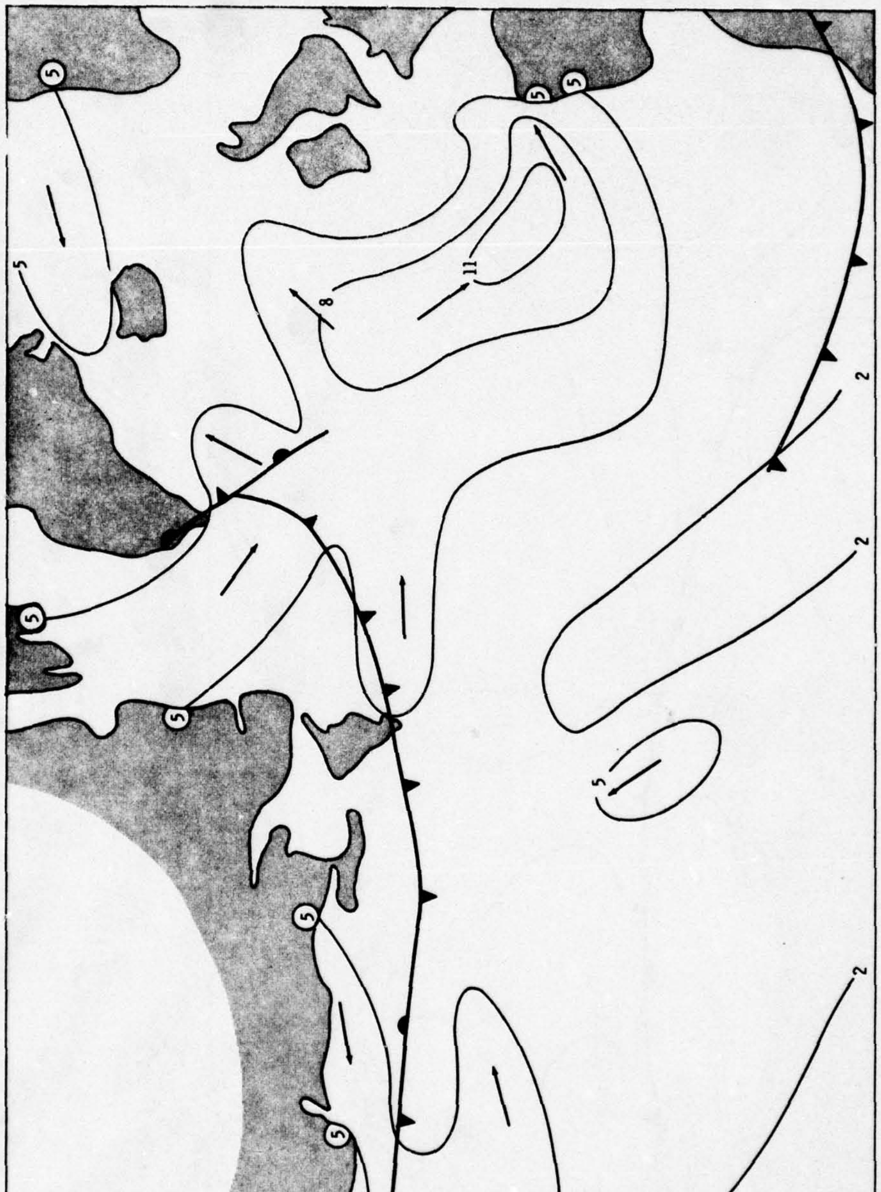

Figure 4-3(a) Sea Condition Chart, 1230Z 8 September 1956

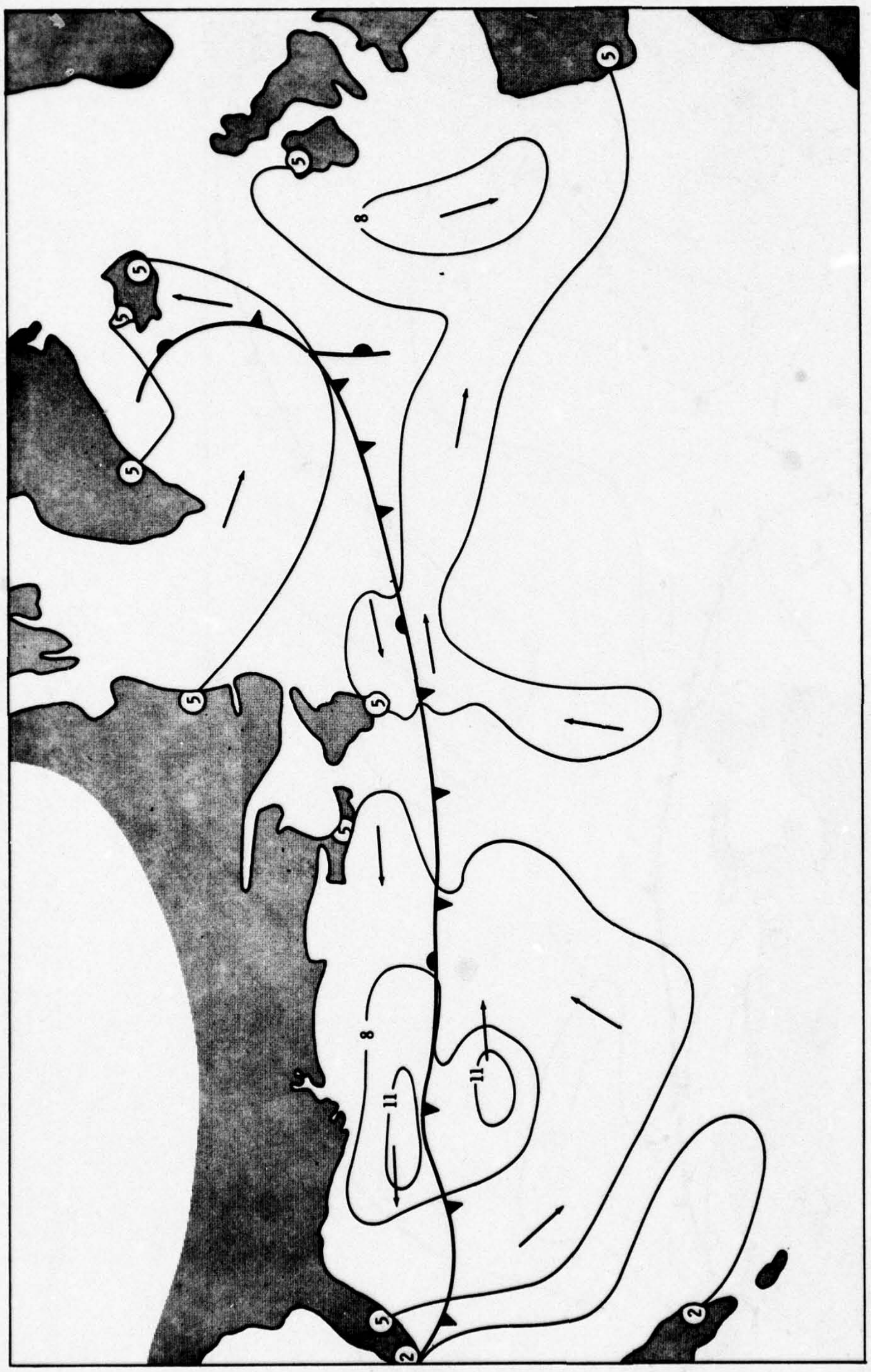

Figure 4-3(b) Sea Condition Chart, 1230Z 9 September 1956

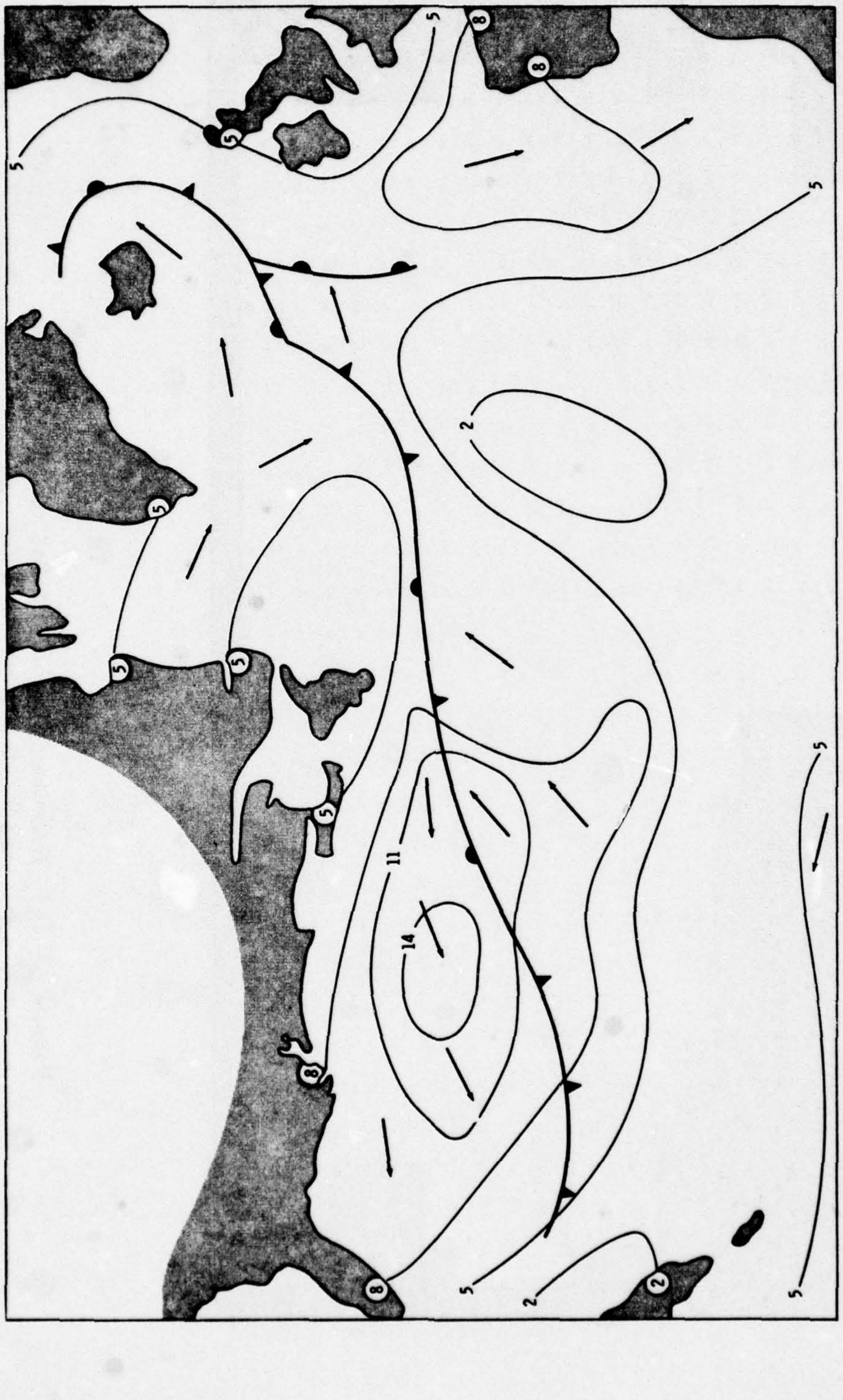

Figure 4-3(c) Sea Condition Chart, 1230Z 10 September 1956

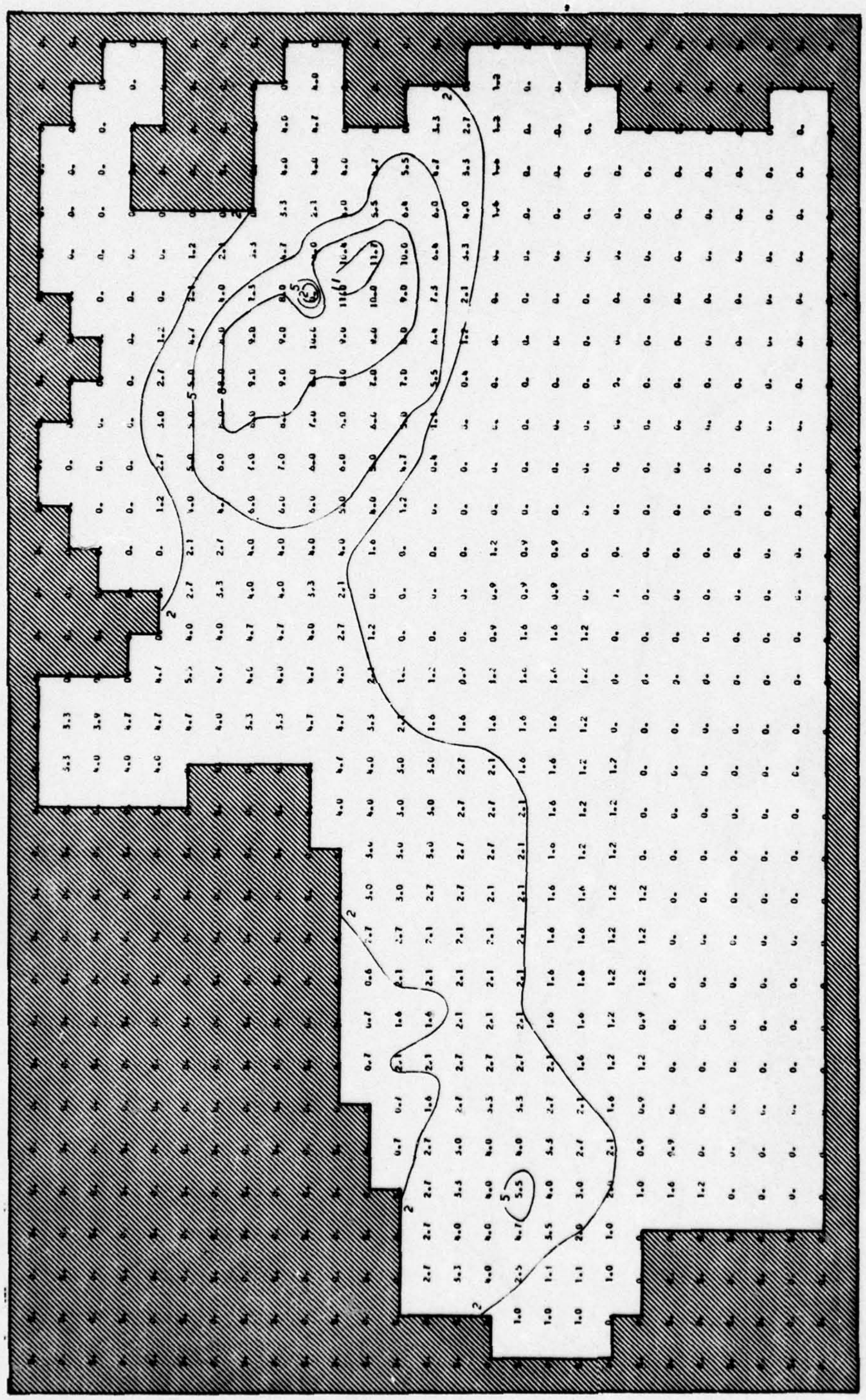

Figure 4-4(a) Forecast Map at the End of Time Step 0,
1230Z 8 September 1956

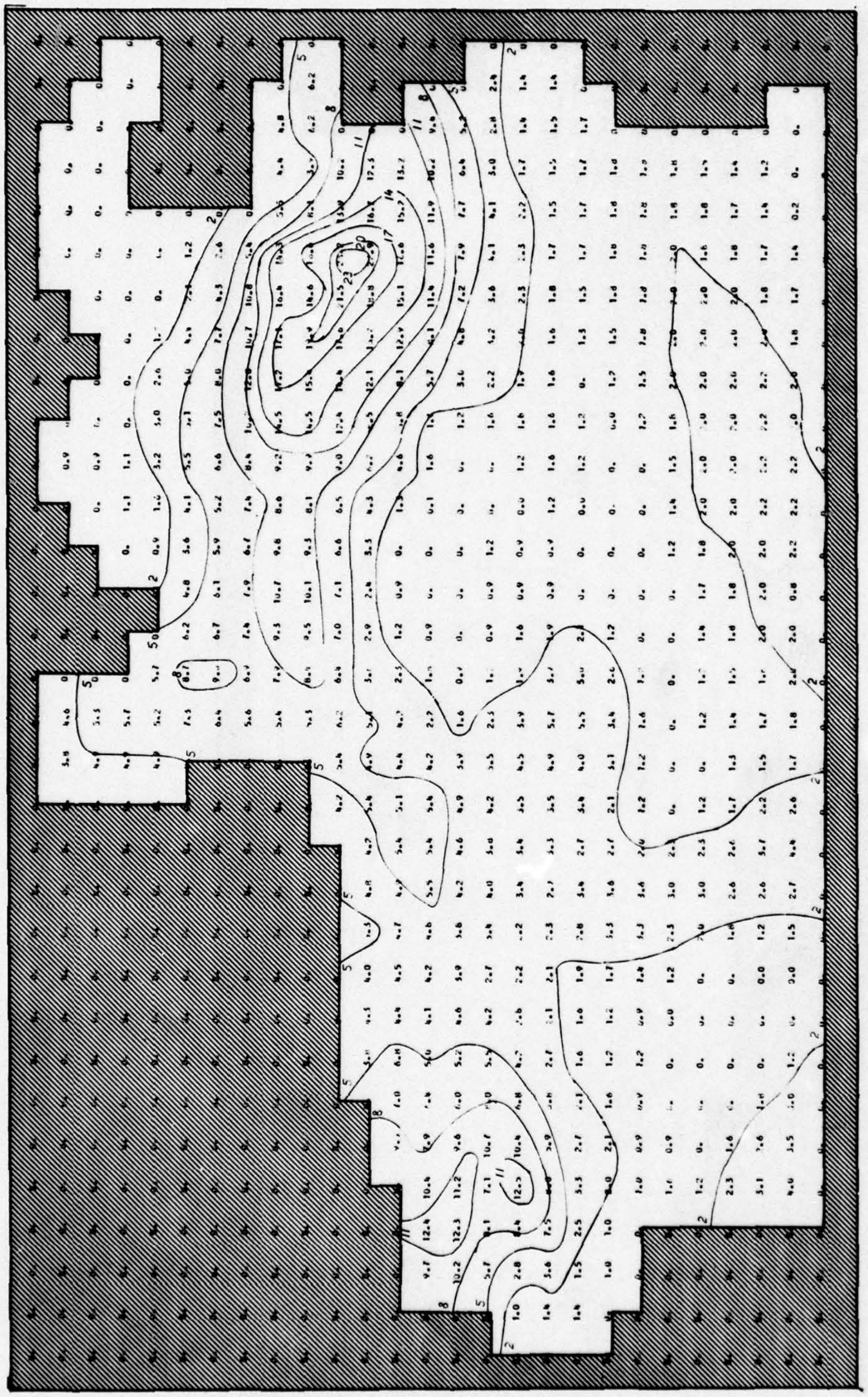

Figure 4-4(b) Forecast Map at the End of Time Step 6, 0030Z 9 September 1956

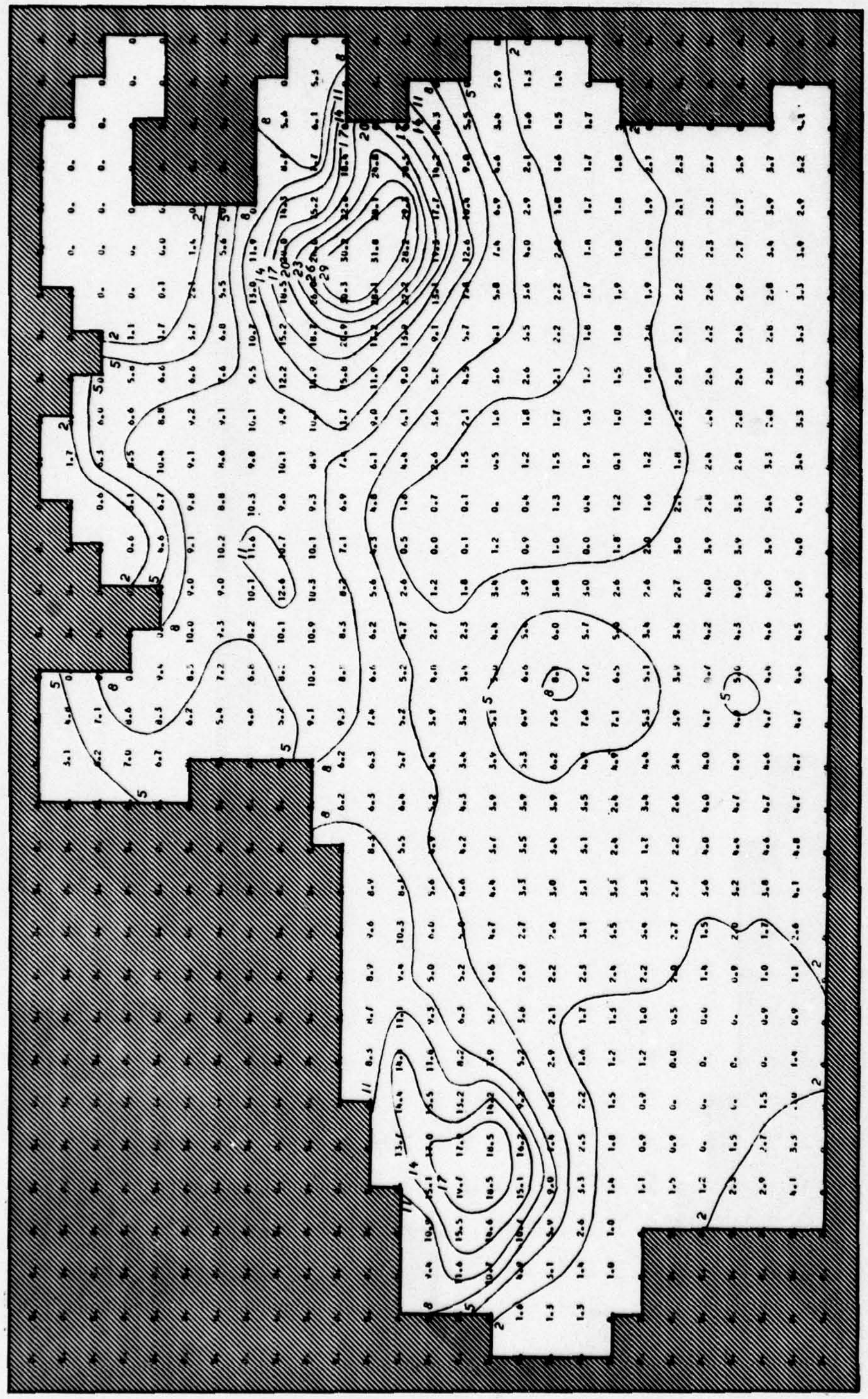

Figure 4-4(c) Forecast Map at the End of Time Step 12, 1230Z
9 September 1956

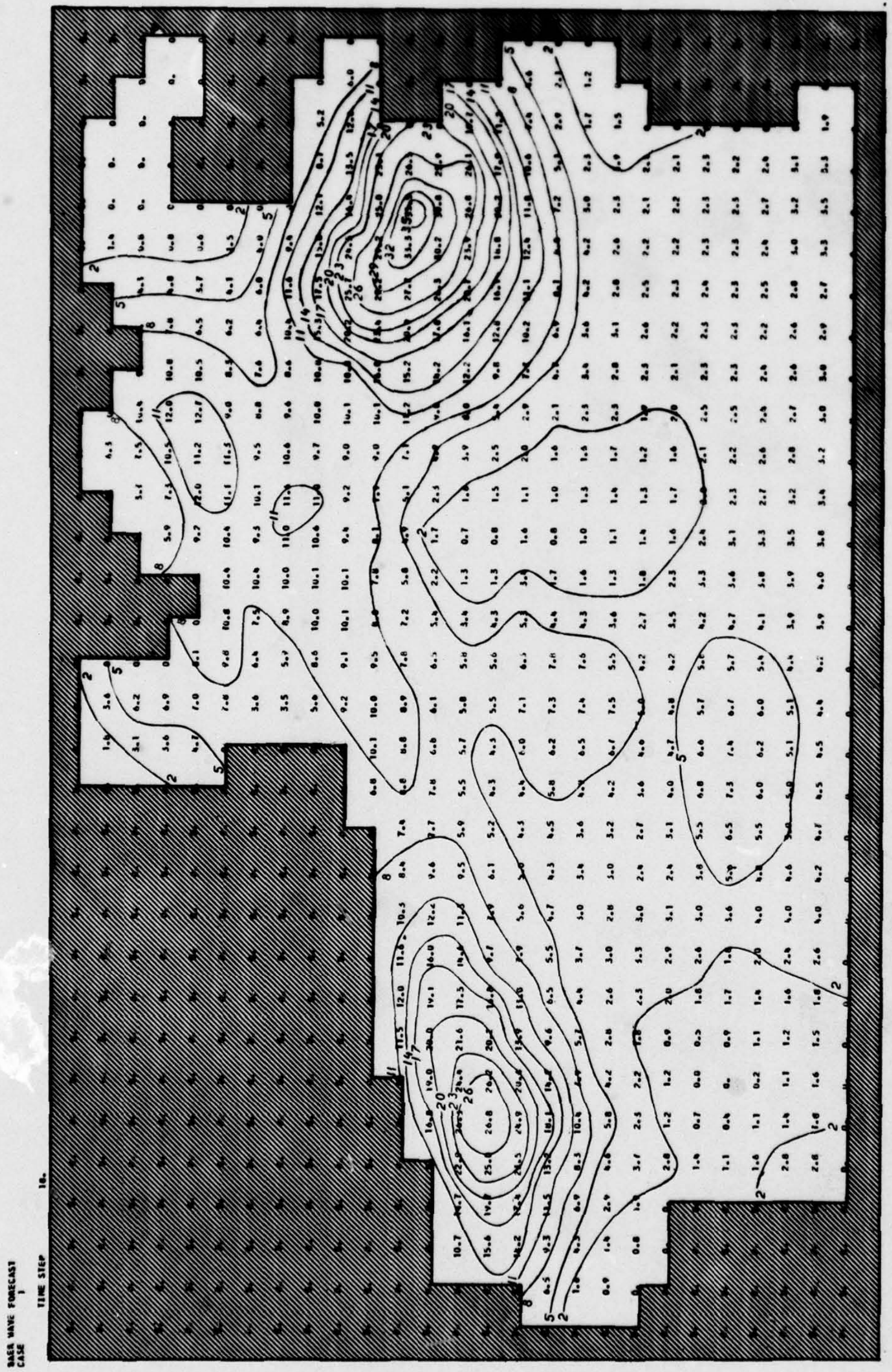

Figure 4-4(d) Forecast Map at the End of Time Step 18, 0030Z 10 September 1956

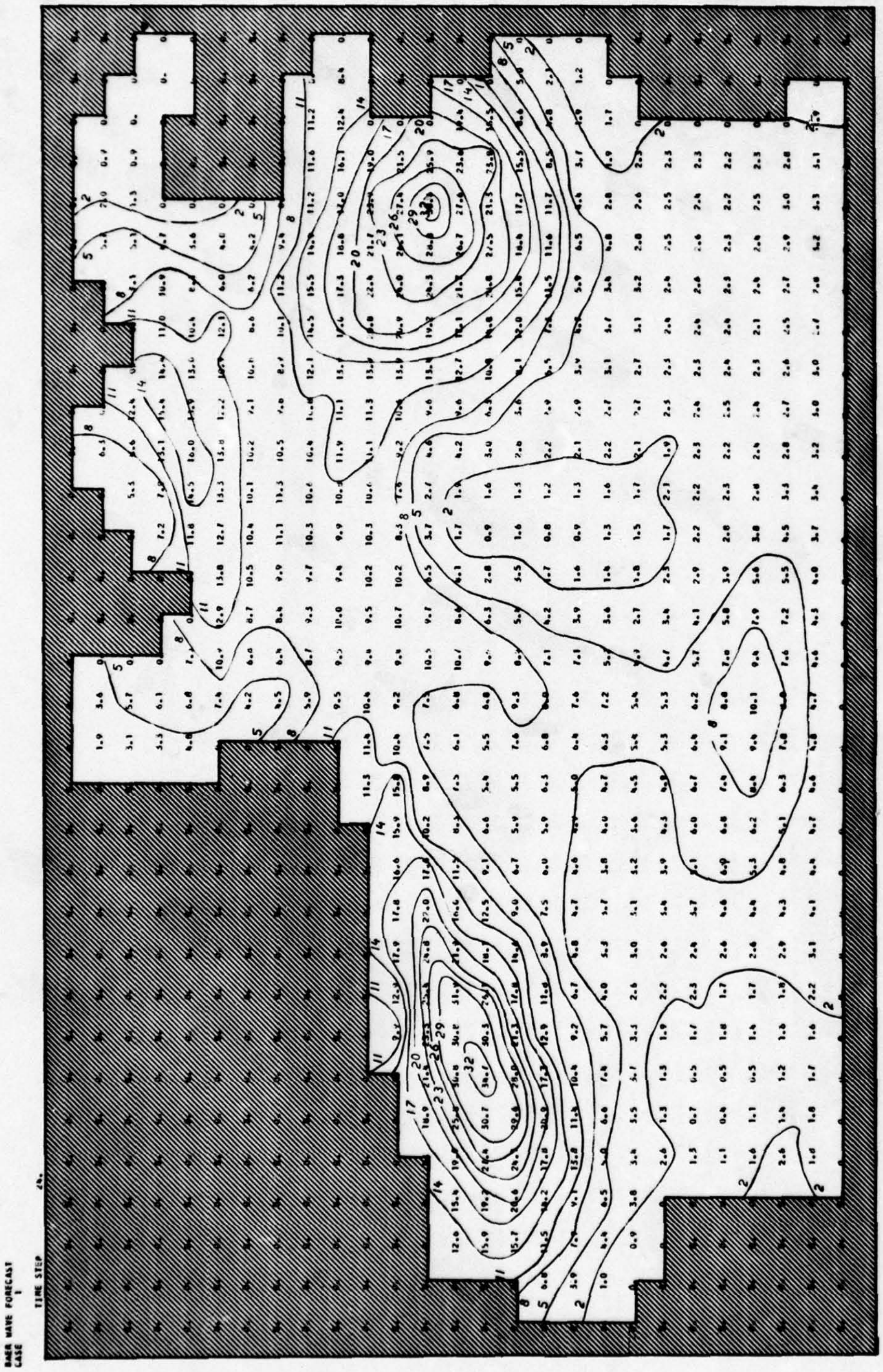

Figure 4-4(e) Forecast Map at the End of Time Step 24, 1230Z 10 September 1956

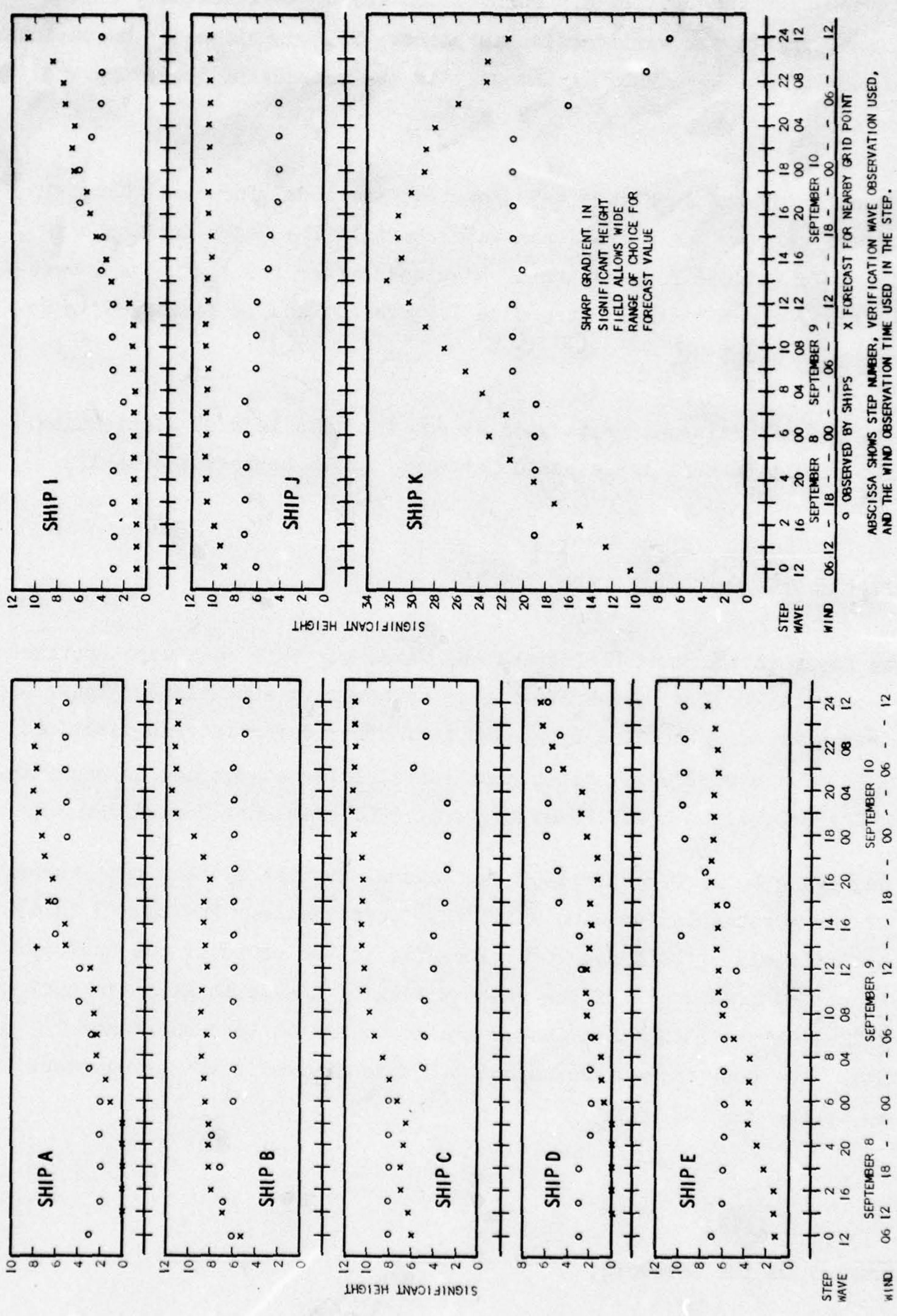

Figure 4-5 Case I, Verification Graphs

which was in the high wave region off Europe, confirmed the inadequacy of the operational wave charts for verification purposes. No comparison of the periods was made because of the well known inadequacy in the methods of observing and recording periods.

These verification graphs in Figure 4-5 show that the model forecast the heights about as well as the operational wave charts. The major failing of the model is the continued forecasting of high seas after the seas have lowered. This type of error also occurred in the Case II forecast and is discussed in detail in a separate section.

In this test, the method seems quite good except for this lack of dissipation. The important result is that large scale patterns can be represented easily.

4-3 CASE II, 16 THROUGH 18 DECEMBER 1959

All the data for both the wind fields and the waves for this case were provided through the courtesy of New York University,* as shown in Appendix 4. This particular storm is being studied by a number of other scientists, as described in Appendix 5. The synoptic situation and general forecast problem is described by L. Moskowitz as follows: (W.J. Pierson, Jr., 1961, Personal Communication)

"The week beginning on 15 December 1959 saw several frontal systems pass through that area of the North Atlantic with which this paper deals. Position J, situated at approximately 52°40'N and 20°W, lies far to the north of the subtropical anticyclone and lies south of the major tracks of the North Atlantic cyclones. Storms in this area of the North Atlantic are known for their persistence and intensity. The most impressive aspect of these storms is the development of the state of the sea.

*See paragraph 2 of the Foreword.

"From the point of view of the wave forecaster the storm of 16 - 18 December is of interest. The storm developed from a wave cyclone which had formed on a cold front on 15 December at about 12Z. Between 18Z on the 15th and 00Z on the 16th, the storm had developed its own circulation and the central pressure dropped to 984mb at 00Z on the 16th. At this time the frontal system associated with the storm had partially occluded. The storm center moved rapidly towards the northeast and on the 16th, at about 18Z, had a central pressure of 960mb and was located at 57.5°N and 21°W. Winds behind the storm on the order of fifty knots had developed between 06 and 12Z on the 16th and persisted through 18Z on 17 December. At about 00Z on the 17th, the storm center began to stagnate at about 60°N and 20°W, however, the frontal system continued its rapid eastward movement. At about 18Z on the 17th the storm center had begun to fill. At 06Z on the 18th the central pressure had already increased to 972mb.

"At 18Z on 16 December, the OWS Weather Reporter passed through the occluded front associated with the storm center. At this time thirty knot winds were reported. Six hours later the winds had built up to 60 knots from the southwest. The significant wave height, $\overline{H}_{1/3}$, jumped from 15.7' at 18Z on 16 December to 26.2' at 00Z on the 17th. Winds on the order of sixty knots (Beaufort 11) were not uncommon in the general area during the above times. It is to be noted that all wind data until 12Z on 17 December were Beaufort estimates. The maximum $\overline{H}_{1/3}$ of 39.7' occurred at 18Z on 17 December. The wind speed at this time was 48 knots. The wave heights began to decrease steadily thereafter, except for a secondary maximum of 35.4' at 00Z on 18 December.

"When the data station (OWS in this case) is not stationary, the forecasting problem is further complicated. Such is this case. At 00Z on 15 December, the OWS at position J was already underway for its home port. The OWS "Weather Reporter", the relief ship, was also underway heading for position J at the same time. The two ships passed each other sometime between 00Z and 06Z on 16 December (presumed from synoptic charts). Since the wave records used were taken from the OWS "Weather Reporter", the fetches to be used in forecasts become even more critical. Not until 18Z on 17 December did the "Weather Reporter" reach position J even though she reported she was at position J as early as 12Z on 17 December."

Hindcasts were made for the entire area, but only the significant heights for the area near the observing ship are shown in Figures 4-6(a) through 4-6(f). The crosses on this Figure show the relative position of the observing ship at the respective times. The complete spectra for nearby grid points was also printed. Some examples of this are shown in Tables 4-2(a) through 4-2(c). Because of the slight difference in the reporting and computing intervals, a comparison chart for verification of significant heights was plotted and is presented as Figure 4-7.

There are three significant points shown in Figure 4-7 that require discussion. Most of the 11 - 17 foot significant heights in the initial observations were due to swell, because the winds were only 11 - 17 knots. The forecasting model drops initial swell so that it automatically cut this to about two feet.

Despite this expected initial handicap and the rapidly rising sea, the forecasting model caught up with the observed 35 foot sea after only one day of hindcasting, and followed the observed significant height in the succeeding twelve hours. As seen in Figure 4-7, the forecast rise in height is parallel to that observed with a time lag due to poor initial conditions. At this time, the winds dropped and changed direction and the sea was observed to lower rapidly to below 15 feet in twelve hours. The model did not predict this rapid decrease. Possible reasons for this error are discussed in the following section.

A comparison of the observed and forecast values of the frequency spectrum was made with disappointing, but not unsuspected results, as shown in Figures 4-8(a) through 4-8(c). In these figures, the plotted points represent the estimated spectra and the 90% confidence interval integrated over a frequency increment of 0.00555 sec^{-1}. The stippled regions show the forecasts on the same scale. The model forecasts do not have as much low frequency energy as the spectra computed from the observations of the OWS Weather Reporter. There are several possible causes for this discrepancy. They are discussed in the following section.

9.0	9.0	8.0	6.3	1.6	0.	0.
13.0	11.7	9.4	4.7	1.6	0.	0.
14.4	10.5	7.2	5.4	2.1	1.[illegible]	0.
14.4	10.3	7.3	5.4	2.7	2.[illegible]	1.6
17.1	10.3	7.2	6.4	5.5	5.5	3.9
29.9	22.5	14.4	11.7	8.2	7.2	7.2
26.0	25.0	1[illegible].0	15.0	6.0	7.0	7.0
19.0	15.0	9.0	8.0	5.0	6.0	8.0

STEP 0: 12Z, DECEMBER 16, 1959

9.0	10.7	9.6	7.5	2.3	1.1	0.
14.5	13.0	9.9	5.1	2.5	1.2	0.9
15.8	11.8	8.2	5.8	3.0	2.3	1.2
15.3	11.1	8.5	7.1	4.9	4.9	3.6
17.6	12.0	9.4	8.7	7.6	6.6	4.7
33.0	24.5	16.5	13.9	8.5	7.9	8.3
29.0	28.2	19.4	17.5	8.6	9.0	8.8
21.1	16.3	11.7	10.6	7.8	8.1	9.8

STEP 1: 14Z, DECEMBER 16, 1959

9.0	12.3	11.3	8.9	3.5	1.8	0.
15.9	14.3	10.9	6.0	3.9	2.0	1.2
17.2	13.1	9.4	6.8	4.4	3.9	2.0
16.3	12.1	9.9	8.8	7.0	7.0	6.0
18.5	13.6	11.4	10.8	9.4	7.5	5.2
35.6	26.6	18.6	16.0	8.8	8.5	9.1
31.9	31.2	22.7	20.0	10.9	10.8	10.6
23.1	17.6	14.1	12.9	10.3	10.0	11.5

STEP 2: 16Z, DECEMBER 16, 1959

10.1	14.0	12.9	10.4	5.3	3.4	1.2
17.2	15.9	12.4	7.4	6.0	4.0	2.4
18.3	14.9	10.9	8.5	6.5	6.3	3.9
17.3	13.6	11.5	11.1	9.6	9.1	8.0
21.1	17.3	15.3	14.3	11.7	9.3	7.2
37.1	31.0	21.9	19.8	11.9	11.1	10.9
34.4	34.1	26.6	23.9	14.6	13.6	12.3
25.1	19.3	16.1	14.7	12.1	11.7	13.1

STEP 3: 18Z, DECEMBER 16, 1959

11.0	15.6	14.4	11.6	7.0	5.2	2.1
18.9	17.1	13.8	9.1	8.0	6.1	4.1
19.7	16.9	12.5	10.3	8.7	8.4	5.9
17.6	15.3	13.0	13.3	12.0	10.9	9.9
22.9	22.5	19.5	17.7	13.7	11.3	9.1
40.2	36.4	27.1	20.3	18.7	13.5	12.5
36.7	37.0	29.4	27.4	21.9	16.2	13.9
27.6	23.0	19.3	16.5	13.8	13.5	14.7

STEP 4: 20Z, DECEMBER 16, 1959

DATE	TIME	OBSERVED SIGNIFICANT HEIGHT	90% CONFIDENCE INTERVAL
DECEMBER 16, 1959	12Z	13.3	12.0 - 14.6
	18Z	15.7	14.6 - 16.8
DECEMBER 17, 1959	00Z	26.1	23.6 - 28.7

NOTES:

ALL SIGNIFICANT HEIGHTS ARE IN FEET

LOCATIONS OF THE GRID POINTS ARE SHOWN BY THE DECIMAL POINTS

RELATIVE LOCATIONS OF THE OBSERVING SHIP ARE REPRESENTED BY THE CROSSES

Figure 4-6(a) Forecast Maps at the End of the Respective Time Steps and the Observed Significant Heights for Verification

11.6	17.2	15.9	12.8	8.7	6.9	3.4
19.6	18.8	15.2	10.7	9.9	8.1	5.6
20.8	18.6	13.7	11.9	10.6	10.2	7.9
18.8	17.1	14.5	15.5	14.2	12.6	11.6
25.6	26.6	23.4	21.0	15.7	12.9	10.9
41.7	38.4	30.4	23.7	21.1	15.7	14.2
40.1	39.6	32.5	30.6	25.0	18.7	15.5
29.2	23.0	21.4	18.3	15.6	15.2	16.4

STEP 5: 22Z, DECEMBER 16, 1959

14.2	17.9	15.2	11.5	8.7	6.9	3.7
21.7	21.8	16.8	9.9	10.2	8.2	6.7
21.4	20.6	16.6	14.2	12.2	12.7	9.7
18.5	19.6	17.2	16.9	16.3	16.3	14.1
24.8	27.5	26.2	23.5	19.0	15.5	12.9
38.3	41.9	33.8	26.2	21.9	16.3	16.9
41.1	41.6	35.0	32.1	26.8	22.0	18.4
33.2	31.2	25.5	19.9	16.4	16.9	18.0

STEP 6: 00Z, DECEMBER 17, 1959

16.3	18.0	15.5	11.5	8.7	6.9	3.7
22.8	21.9	17.1	10.2	10.4	8.2	7.5
23.3	22.7	21.5	16.8	13.8	14.2	12.0
18.5	21.3	21.5	20.2	18.5	19.1	16.7
26.6	28.4	25.4	27.5	23.2	17.3	15.1
39.6	45.4	38.5	34.0	26.5	18.8	21.9
39.9	42.5	37.0	32.7	28.5	25.7	21.4
33.6	33.5	27.7	25.0	21.5	20.3	17.7

STEP 7: 02Z, DECEMBER 17, 1959

19.0	20.8	14.6	9.9	8.7	6.8	4.7
24.4	23.6	17.8	10.6	10.7	8.1	8.2
24.3	24.7	23.9	20.3	15.0	15.8	13.8
18.5	21.9	24.3	23.3	17.6	24.3	17.7
28.6	28.6	26.9	28.6	24.9	21.1	18.7
41.2	45.0	39.9	35.7	27.1	22.3	21.8
41.0	45.3	39.1	35.0	30.0	28.9	24.6
33.7	34.4	31.1	26.2	22.9	21.0	19.4

STEP 8: 04Z, DECEMBER 17, 1959

18.2	21.0	14.3	10.5	8.8	8.6	8.2
24.2	24.1	19.7	14.4	12.5	13.0	12.5
22.8	23.9	24.6	22.0	17.2	18.0	16.0
19.5	22.5	26.1	25.6	20.8	25.9	20.0
28.7	30.8	29.9	31.8	28.6	24.8	21.7
41.8	46.1	42.8	38.7	30.3	25.7	24.4
40.7	45.5	41.2	37.3	32.3	30.7	26.6
33.2	34.7	31.2	27.2	23.5	23.2	21.6

STEP 9: 06Z, DECEMBER 17, 1959

DATE	TIME	OBSERVED SIGNIFICANT HEIGHT	90% CONFIDENCE INTERVAL
DECEMBER 17, 1959	00Z	26.1	23.6 - 28.7
	03Z	32.9	29.6 - 36.6
	06Z	35.2	31.8 - 38.9
	09Z	34.4	31.4 - 37.9

NOTES:

ALL SIGNIFICANT HEIGHTS ARE IN FEET

LOCATIONS OF THE GRID POINTS ARE SHOWN BY THE DECIMAL POINTS

RELATIVE LOCATIONS OF THE OBSERVING SHIP ARE REPRESENTED BY THE CROSSES

Figure 4-6(b) Forecast Maps at the End of the Respective Time Steps and the Observed Significant Heights for Verification

18.3	22.9	15.9	12.0	9.6	10.4	10.1
24.8	24.0	21.2	15.9	13.6	14.4	14.1
22.8	24.3	26.6	24.8	18.4	19.7	17.8
19.4	22.0	28.4	27.5	22.9	28.8	23.3
28.5	31.3	32.6	35.1	31.8	27.5 ×	23.8
40.7	47.2	46.8	42.0	33.7	28.0	26.3
37.4	43.9	43.2	38.8	35.5	32.8	29.3
35.0	36.3	33.8	27.5	24.3	25.1	21.0

STEP 10: 08Z, DECEMBER 17, 1959

18.1	23.4	16.4	12.5	11.6	10.5	11.1
23.9	25.2	21.8	17.0	15.3	15.5	16.8
22.7	24.1	27.0	27.3	19.3	21.5	20.1
20.5	23.3	26.7	30.3	24.6	31.0	26.0
31.0	34.6	36.3	36.2	36.4	32.5 ×	26.6
34.6	44.6	45.3	43.8	39.4	35.3	29.4
34.4	41.7	44.0	41.5	39.4	33.8	29.1
34.6	35.9	38.9	32.9	26.9	27.5	21.3

STEP 11: 10Z, DECEMBER 17, 1959

19.1	21.5	15.9	13.7	12.9	12.7	12.4
22.9	26.2	21.7	18.4	16.3	16.3	17.5
22.7	24.4	25.5	27.2	22.3	21.6	21.6
20.9	23.9	30.1	31.9	26.9	30.8	26.0
30.2	33.8	35.9	37.7	37.4	35.3 ×	30.2
34.1	44.0	44.7	45.0	41.8	37.1	33.9
33.0	40.9	44.0	41.3	41.6	35.9	30.8
34.1	36.5	38.9	34.0	27.9	26.7	23.9

STEP 12: 12Z, DECEMBER 17, 1959

19.0	21.1	15.9	14.1	13.8	14.5	13.9
22.6	26.1	22.2	20.2	17.4	17.2	17.9
22.5	24.0	26.0	29.1	23.7	23.3	22.0
20.8	24.1	31.3	34.6	29.0	31.7	26.4
30.4	34.0	36.4	38.4	39.8	37.2 ×	32.1
32.1	42.2	43.4	46.3	45.0	39.3	35.2
31.5	40.5	43.8	41.8	43.9	38.3	33.4
33.2	35.3	38.4	33.6	28.5	25.9	26.4

STEP 13: 14Z, DECEMBER 17, 1959

18.5	17.8	15.8	14.5	14.9	16.4	14.3
22.8	24.3	19.9	18.7	17.7	18.4	17.7
19.3	22.0	24.6	27.1	22.4	21.8	21.7
23.6	26.9	32.2	35.8	26.5	29.2	27.9
28.4	31.9	36.7	41.1	42.3	38.4 ×	34.2
29.7	38.5	40.5	44.4	45.5	42.6	37.0
33.4	39.7	42.8	41.6	45.8	41.1	35.2
32.7	36.7	38.8	35.7	31.0	28.3	29.1

STEP 14: 16Z, DECEMBER 17, 1959

DATE	TIME	OBSERVED SIGNIFICANT HEIGHT	90% CONFIDENCE INTERVAL
DECEMBER 17, 1959	06Z	35.2	31.8 - 38.9
	09Z	34.4	31.4 - 37.9
	12Z	32.0	29.1 - 35.1
	15Z	33.9	31.0 - 37.2
	18Z	39.7	35.6 - 44.3

NOTES:

ALL SIGNIFICANT HEIGHTS ARE IN FEET

LOCATIONS OF THE GRID POINTS ARE SHOWN BY THE DECIMAL POINTS

RELATIVE LOCATIONS OF THE OBSERVING SHIP ARE REPRESENTED BY THE CROSSES

Figure 4-6(c) Forecast Maps at the End of the Respective Time Steps and the Observed Significant Heights for Verification

18.5	17.9	15.8	14.5	15.0	18.7	15.8
22.8	24.3	21.9	20.5	19.5	22.9	20.3
20.3	23.6	26.4	29.0	24.9	25.3	24.8
24.8	26.9	32.2	37.5	30.2	32.1	29.8
28.4	31.9	36.8	41.1	42.6	40.6	34.6
29.7	38.5	40.5	44.4	45.5	44.1	38.6
33.4	39.7	42.8	41.6	45.8	41.5	36.9
33.2	36.7	38.8	35.7	31.0	29.0	29.1

STEP 15: 18Z, DECEMBER 17. 1959

16.1	15.9	15.7	14.4	14.3	20.2	18.0
20.6	21.5	23.9	22.5	19.9	26.4	22.1
22.0	27.7	26.9	28.6	26.8	27.4	26.0
23.8	26.1	30.5	36.4	31.3	33.6	30.3
27.7	30.8	37.9	39.9	41.7	41.0	33.8
28.4	35.8	39.0	45.1	45.5	46.7	39.8
32.7	35.7	40.4	41.4	45.1	41.6	38.6
32.5	36.6	39.1	36.1	32.2	31.0	28.4

STEP 16: 20Z, DECEMBER 17, 1959

16.1	16.0	15.5	14.4	14.4	19.6	19.0
20.8	21.0	25.8	23.9	22.7	30.2	25.0
22.0	30.7	26.8	30.1	26.5	30.6	26.6
25.0	27.4	30.3	37.0	35.6	33.5	34.9
24.8	27.5	34.5	38.6	42.5	43.5	40.2
29.4	32.4	36.5	42.6	44.7	49.1	41.5
31.5	34.6	38.0	39.3	42.6	42.4	40.2
28.6	34.5	35.8	36.7	35.3	33.3	29.7

STEP 17: 22Z, DECEMBER 17, 1959

15.7	15.4	12.4	12.0	17.1	20.5	18.4
21.3	20.6	24.4	22.1	22.3	28.3	23.9
22.0	30.2	27.2	30.5	28.5	31.2	29.4
25.5	27.8	30.8	36.8	36.9	35.1	36.7
26.3	28.5	34.5	36.7	44.8	43.6	41.3
29.6	32.9	38.5	42.1	44.4	49.2	41.2
33.5	36.1	39.1	39.2	42.5	42.2	40.3
30.4	35.9	37.3	37.5	35.8	33.3	30.2

STEP 18: 00Z, DECEMBER 18, 1959

15.6	14.5	12.4	12.2	17.8	20.6	19.2
21.0	20.5	24.5	23.4	24.9	30.0	25.5
22.0	30.2	26.7	30.7	30.4	33.1	31.1
26.9	27.8	31.0	35.8	37.1	38.0	37.0
27.9	29.9	34.4	36.0	42.3	42.5	42.4
31.2	33.7	37.2	41.6	44.4	48.1	44.4
34.9	37.0	38.4	38.6	40.6	43.0	40.4
32.0	37.0	34.8	37.9	35.3	31.4	32.3

STEP 19: 02Z, DECEMBER 18, 1959

DATE	TIME	OBSERVED SIGNIFICANT HEIGHT	90% CONFIDENCE INTERVAL
DECEMBER 17, 1959	18Z	39.7	35.58 - 44.25
	21Z	31.6	28.70 - 34.6
DECEMBER 18, 1959	00Z	35.3	31.8 - 39.2
	03Z	25.6	23.1 - 28.3

NOTES:

ALL SIGNIFICANT HEIGHTS ARE IN FEET

LOCATIONS OF THE GRID POINTS ARE SHOWN BY THE DECIMAL POINTS

RELATIVE LOCATIONS OF THE OBSERVING SHIP ARE REPRESENTED BY THE CROSSES

Figure 4-6(d) Forecast Maps at the End of the Respective Time Steps and the Observed Significant Heights for Verification

14.9	15.4	12.7	13.1	18.7	21.5	19.5
21.6	21.5	23.8	22.1	24.9	27.8	28.3
22.3	26.8	26.9	30.3	31.7	34.8	33.8
27.2	29.2	30.9	35.3	39.1	39.5	37.7
29.3	31.1	33.5	36.2	44.2	41.8	43.0
34.5	36.0	37.7	41.3	44.1	48.4	44.3
34.8	36.1	37.6	39.2	40.6	43.1	40.4
32.1	36.7	34.9	37.8	35.4	31.9	32.7

STEP 20: 04Z, DECEMBER 18, 1959

13.5	16.8	13.3	11.8	17.7	20.2	18.4
18.5	20.4	18.2	20.9	24.5	23.2	29.7
24.3	26.6	28.1	30.8	30.4	32.8	34.7
27.7	29.8	32.5	36.5	41.0	39.6	38.1
30.7	32.3	32.2	33.9	43.6	43.0	44.0
34.9	32.7	36.5	40.0	44.6	47.5	44.5
31.4	36.5	36.8	39.4	40.7	42.0	39.7
26.4	33.4	36.5	38.0	35.9	32.3	32.1

STEP 21: 06Z, DECEMBER 18, 1959

13.5	17.2	13.5	11.9	17.7	20.2	18.4
19.7	21.6	19.7	22.7	25.7	23.8	31.4
25.7	26.2	26.9	29.0	30.0	28.7	33.2
30.2	29.2	33.5	35.4	40.4	38.6	36.7
33.3	33.5	32.5	33.5	40.0	42.6	41.9
35.6	33.7	34.7	38.7	42.4	44.8	44.1
31.2	34.9	33.7	39.9	40.4	42.5	41.1
26.2	31.8	36.5	37.2	35.9	34.8	35.1

STEP 22: 08Z, DECEMBER 18, 1959

13.6	17.7	13.8	13.5	17.5	19.6	18.1
21.9	22.6	19.4	21.8	25.8	24.0	32.9
27.3	28.3	29.8	29.9	31.3	30.1	33.8
31.9	30.7	34.1	35.1	38.1	38.4	37.6
32.8	33.9	33.9	33.0	37.7	49.7	40.9
35.6	34.5	34.8	37.1	41.9	42.2	42.3
32.7	34.8	34.3	39.7	39.4	40.1	43.7
26.3	31.6	36.1	37.5	36.8	34.9	33.1

STEP 23: 10Z, DECEMBER 18, 1959

16.5	20.3	15.2	13.9	17.0	18.4	19.0
23.8	24.2	22.0	21.8	24.9	24.5	31.3
29.0	31.1	31.0	29.2	29.3	29.3	33.1
32.6	29.0	35.2	36.3	36.8	38.9	37.0
34.3	35.4	35.1	34.0	39.4	41.5	39.9
34.2	33.1	32.5	37.8	42.4	41.8	43.0
32.7	34.6	35.2	39.4	40.3	41.0	43.3
27.9	32.2	36.7	37.8	37.2	36.0	34.4

STEP 24: 12Z, DECEMBER 18, 1959

DATE	TIME	OBSERVED SIGNIFICANT HEIGHT	90% CONFIDENCE INTERVAL
DECEMBER 18, 1959	03Z	25.6	23.1 - 28.3
	06Z	20.6	18.9 - 22.5
	09Z	17.4	15.9 - 19.0
	12Z	13.6	12.1 - 15.0

NOTES:

ALL SIGNIFICANT HEIGHTS ARE IN FEET

LOCATIONS OF THE GRID POINTS ARE SHOWN BY THE DECIMAL POINTS

RELATIVE LOCATIONS OF THE OBSERVING SHIP ARE REPRESENTED BY THE CROSSES

Figure 4-6(e) Forecast Maps at the End of the Respective Time Steps and the Observed Significant Heights for Verification

Table 4-2(a) Example Forecast Directional Spectrum

SPECIAL
CASE 2
TIME = STEP 12.GRIDPOINT = 74

θ = 0	0.2203E-01 0.	0.4306E-00 0.	0.1447E 01 0.	0. 0.	0. 0.
θ = 30	0. 0.	0. 0.	0. 0.	0. 0.	0. 0.
θ = 60	0. 0.	0. 0.	0. 0.	0. 0.	0. 0.
θ = 90	0.1196E-01 0.	0. 0.	0. 0.	0. 0.	0. 0.
θ = 120	0.3515E-01 0.	0.7476E-01 0.	0. 0.	0. 0.	0. 0.
θ = 150	0.5865E-01 0.	0.3076E-00 0.	0.2273E 01 0.	0. 0.	0. 0.
θ = 180	0.7055E-01 0.	0.1543E-01 0.	0.5062E 01 0.	0.8767E 01 0.	0. 0.
θ = 210	0.9283E-01 0.	0.1702E 01 0.	0.5493E 01 0.	0.6646E 01 0.	0.8355E 00 0.
θ = 240	0.1235E-00 0.9765E-03	0.2297E 01 0.	0.6446E 01 0.	0.1235E 02 0.	0.1562E-01 0.
θ = 270	0.1291E-00 0.9765E-03	0.2515E 01 0.	0.8537E 01 0.2691E-01	0.1826E 02 0.2990E-02	0.8789E-02 0.
θ = 300	0.1076E-00 0.	0.2088E 01 0.	0.6727E 01 0.	0.1235E 02 0.	0. 0.
θ = 330	0.6250E-01 0.	0.1248E 01 0.	0.4189E 01 0.	0.1318E-01 0.	0. 0.

For each direction, frequency coordinates are as follows:

0.35	0.188	0.129	0.098	0.079
0.066	0.057	0.050	0.044	0.04

Units are (deg.), (sec^{-1}), and (ft^2/frequency interval), respectively.

Spectral energies are presented in standard machine language "floating point" format, in which the numbers and signs following the Es are the exponents of the base 10 by which the characteristics must be multiplied.

Table 4-2(b) Example Forecast Directional Spectrum

SPECIAL
CASE 2
TIME = STEP 15.GRIDPOINT = 61

θ = 0	0.7910E-01	0.1621E 01	0.5275E 01	0.5420E 01	0.
	0.	0.	0.	0.	0.
θ = 30	0.2203E-01	0.6857E 00	0.1196E 01	0.	0.
	0.	0.	0.	0.	0.
θ = 60	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.
θ = 90	0.1977E-01	0.	0.	0.	0.
	0.	0.	0.	0.	0.
θ = 120	0.1977E-01	0.	0.	0.	0.
	0.	0.	0.	0.	0.
θ = 150	0.5865E-01	0.3076E-00	0.	0.	0.
	0.	0.	0.	0.	0.
θ = 180	0.7910E-01	0.8643E 00	0.1999E 01	0.	0.
	0.	0.	0.	0.	0.
θ = 210	0.1235E-00	0.1543E 01	0.4189E 01	0.1128E 01	0.6103E-04
	0.	0.	0.	0.	0.
θ = 240	0.1235E-00	0.2226E 01	0.7097E 01	0.4785E 01	0.1562E-01
	0.2197E-02	0.	0.1406E-00	0.2441E-01	0.
θ = 270	0.1291E-00	0.2640E 01	0.6606E 01	0.1092E 02	0.
	0.1525E-02	0.	0.	0.	0.
θ = 300	0.1291E-00	0.2615E 01	0.8491E 01	0.1066E 02	0.1983E-02
	0.1763E-01	0.	0.2441E-03	0.	0.
θ = 330	0.1235E-00	0.2465E 01	0.7998E 01	0.1714E 02	0.
	0.	0.	0.	0.	0.

For each direction, frequency coordinates are as follows:

0.35	0.188	0.129	0.098	0.079
0.066	0.057	0.050	0.044	0.04

Units are (deg.), sec^{-1}), and (ft^2/frequency interval), respectively.

Spectral energies are presented in standard machine language "floating point" format, in which the numbers and signs following the Es are the exponents of the base 10 by which the characteristics must be multiplied.

Table 4-2(c) Example Forecast Directional Spectrum

SPECIAL
CASE 2
TIME = STEP 18.GRIDPOINT = 73

θ = 0	0.8355E-01 0.	0.1621E-01 0.	0.5275E 01 0.	0.1112E 02 0.	0.7097E 01 0.
θ = 30	0.4785E-01 0.	0.5742E 00 0.	0.2615E 01 0.	0.2226E 01 0.	0. 0.
θ = 60	0. 0.	0. 0.	0. 0.	0. 0.	0. 0.
θ = 90	0.1196E-01 0.	0. 0.	0. 0.	0. 0.	0. 0.
θ = 120	0.1562E-01 0.	0.7476E-01 0.	0.7656E 00 0.	0.2658E-00 0.	0. 0.
θ = 150	0.4785E-01 0.	0.1283E 01 0.	0.2197E-00 0.	0. 0.	0. 0.
θ = 180	0.4785E-01 0.	0.0999E 01 0.	0.1485E 01 0.	0.7793E 00 0.	0. 0.
θ = 210	0.9765E-01 0.	0.1466E 01 0.	0.4189E 01 0.	0.2226E 01 0.	0.1428E 01 0.
θ = 240	0.1235E-00 0.3076E-00	0.2088E 01 0.5493E-03	0.7097E 01 0.	0.1501E 02 0.	0.9474E 01 0.
θ = 270	0.1348E-00 0.	0.2615E 01 0.1525E-02	0.8131E 01 0.	0.1760E 02 0.	0.1812E 02 0.
θ = 300	0.1291E-00 0.8767E 01	0.2640E 01 0.	0.8767E 01 0.	0.1575E 02 0.	0.3315E 02 0.
θ = 330	0.1181E-00 0.	0.2392E 01 0.	0.7998E 01 0.	0.1235E 02 0.	0.1839E 02 0.

For each direction, frequency coordinates are as follows:

0.35	0.188	0.129	0.098	0.079
0.066	0.057	0.050	0.044	0.04

Units are (deg.), sec^{-1}), and (ft^2/frequency interval), respectively.

Spectral energies are presented in standard machine language "floating point" format, in which the numbers and signs following the Es are the exponents of the base 10 by which the characteristics must be multiplied.

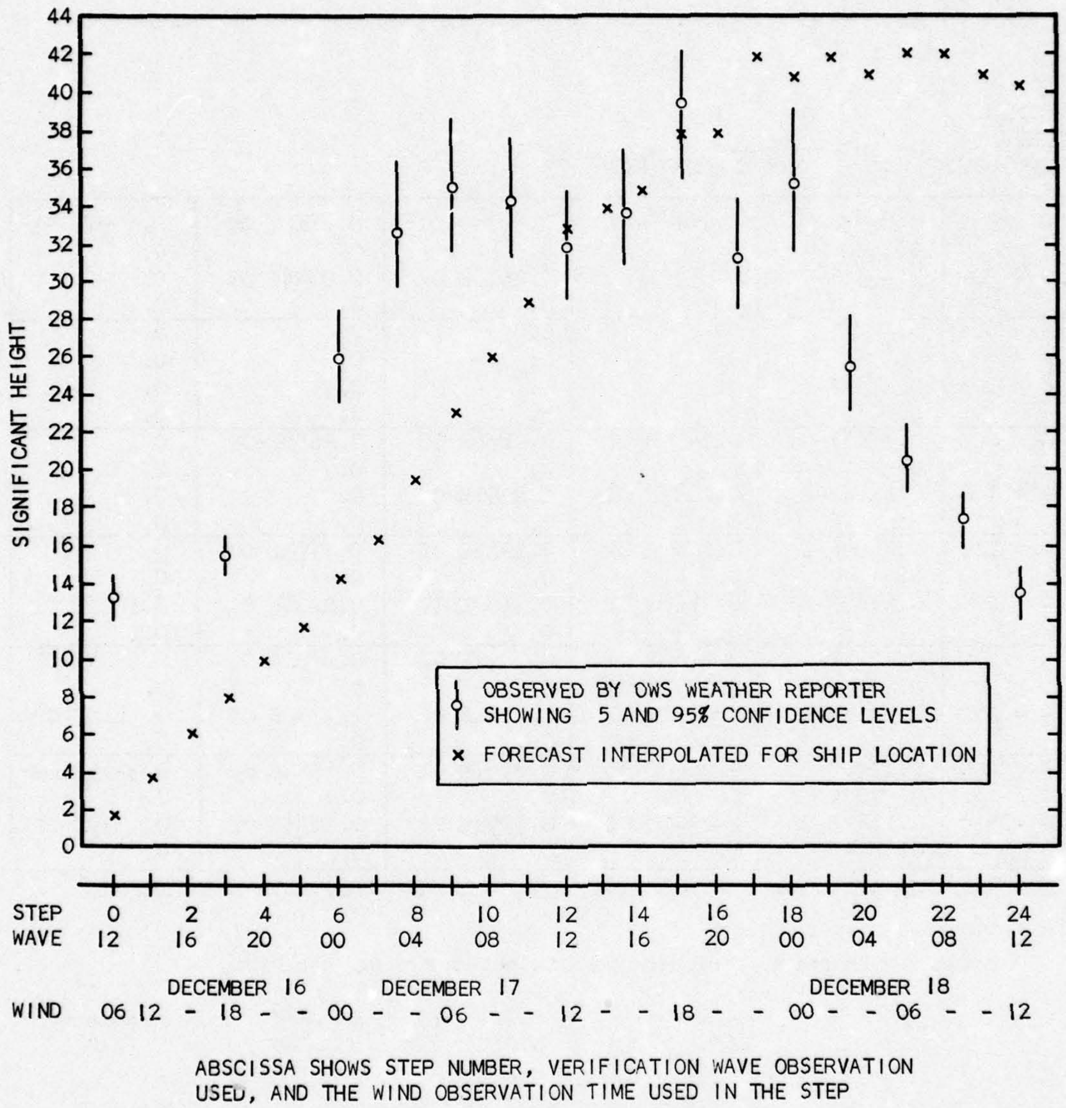

Figure 4-7 Case II, Verification Graphs

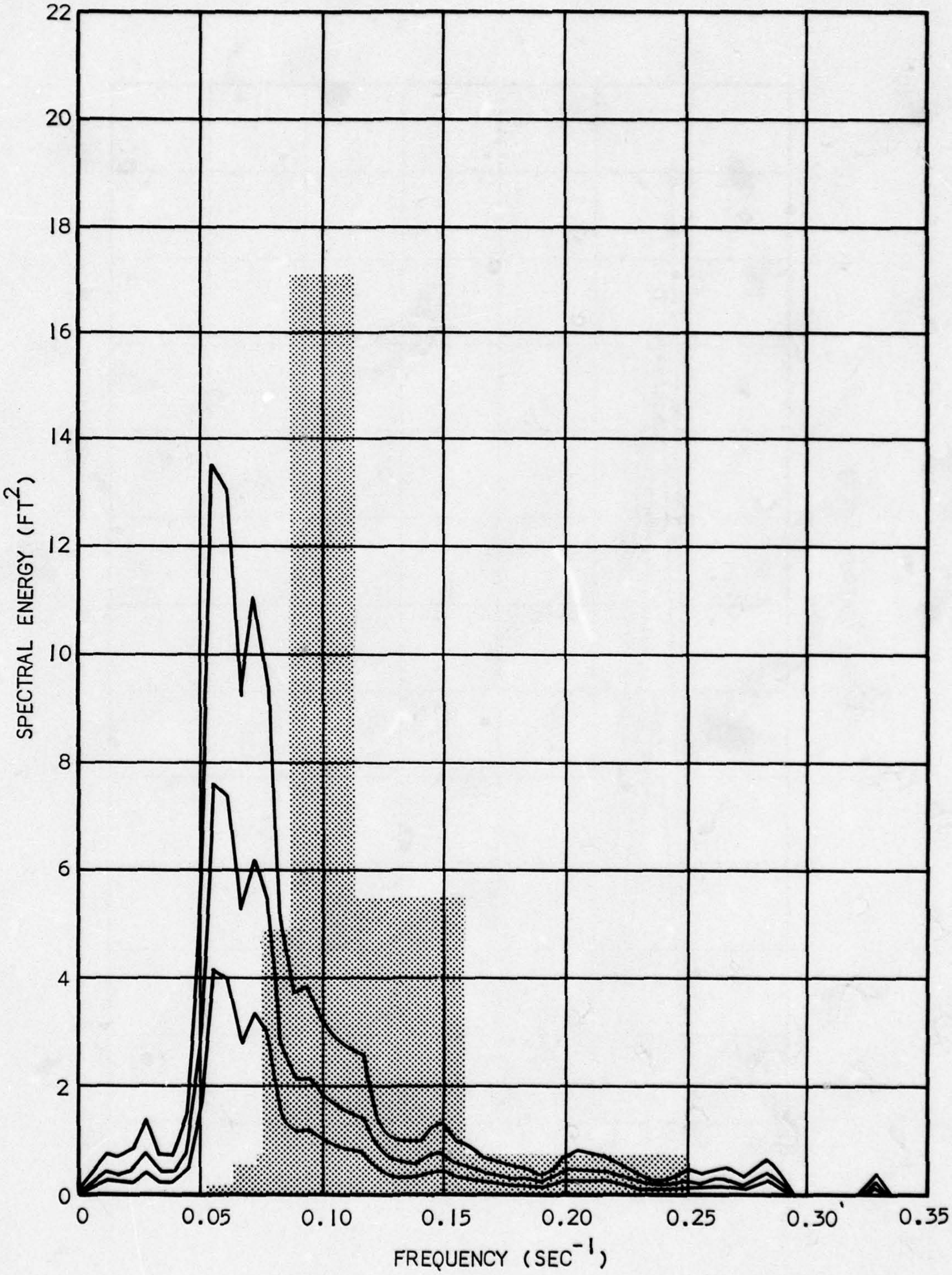

Figure 4-8(a) Comparison of Observed and Forecast Spectra, 1200Z 17 December 1959

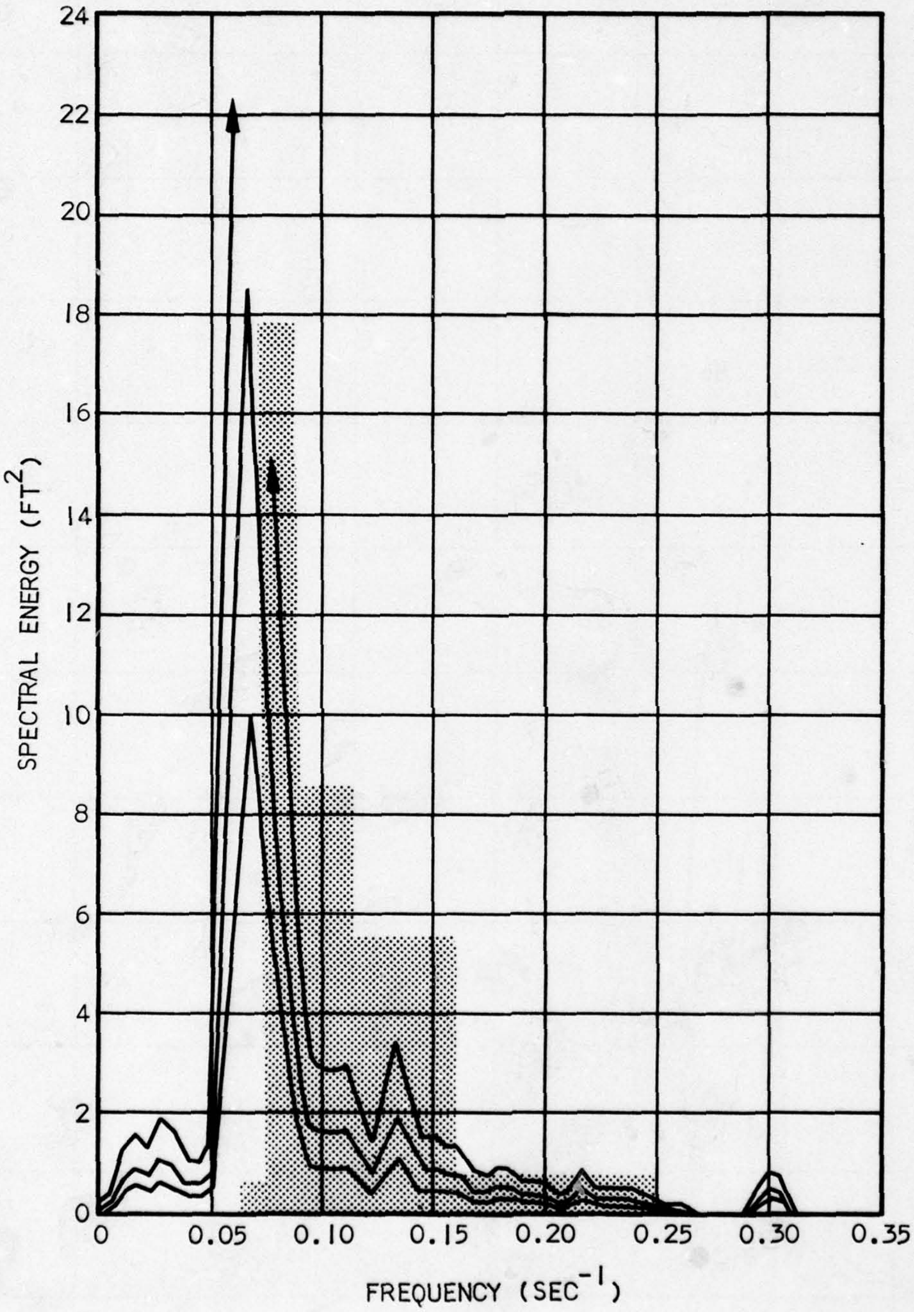

Figure 4-8(b) Comparison of Observed and Forecast Spectra, 1800Z 17 December 1959

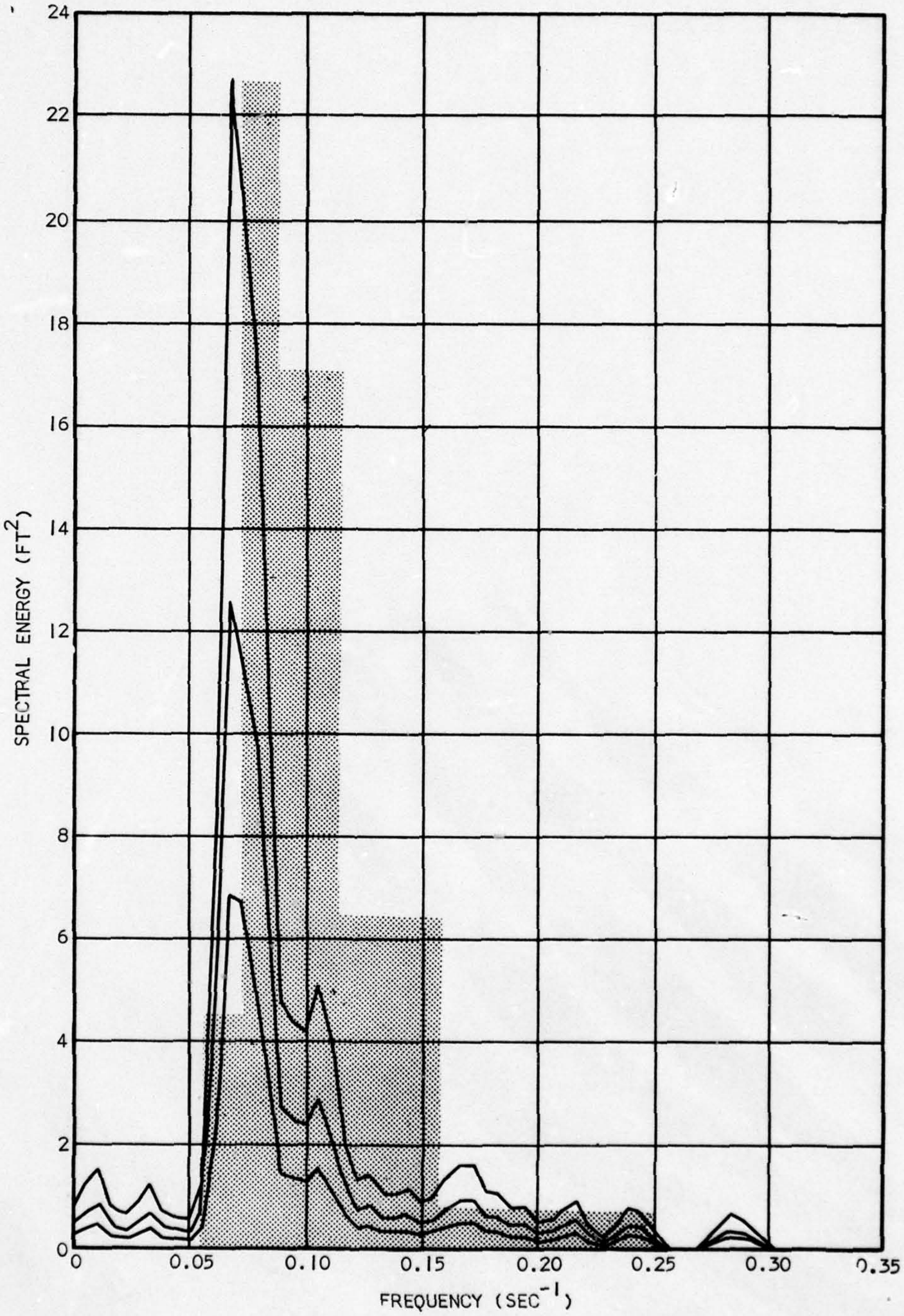

Figure 4-8(c) Comparison of Observed and Forecast Spectra, 000CZ 18 December 1959

CHAPTER 5
CONCLUSIONS

5-1 SUMMARY OF RESULTS

The results described in the preceding section are promising and would be excellent except for three conditions. They are: 1) too few low frequency waves in the spectrum, 2) two slow a decay for swell, and, 3) the lack of knowledge about the initial conditions.

It has been shown that, 1) numerical forecasts of sea and swell spectra for the entire ocean can be made, 2) wave forecasts can be made without defining a fetch, thus decreasing the subjectivity of the forecast, and 3) a completely objective model has been established which should be useful for testing hypotheses and upon which further research can be based. This model keeps track of all frequencies involved and propagates them with the correct group velocities.

5-2 DISCUSSION OF ERRORS

There are several possible causes for having too few low frequency waves in the spectrum, under the assumption that the observations are correct. Long swell, which the model would ignore, could have been present at some distance away in the initial sea. However, this is unlikely because of the smooth shapes of the observed spectra. It was assumed that the energy increment added was a function of the energy within ±90 degrees of the wind direction. If this is changed to consider energy in all directions, lower frequencies and higher waves will result. A more likely possibility is simply that the Neumann spectrum does not predict energy at low enough frequency. This has been pointed out in another study. (W. J. Pierson, Jr., Reference 12)

Another important consideration is the fact that the Neumann spectrum was not devised for this particular purpose. It assumes a constant wind throughout the length of the fetch. However, in the real case which the present model allows, the wind direction often has considerable variation in time. Such a changeable wind direction tends to spread the higher frequencies into other directions before allowing the lower frequencies to grow. A reasonable correction for this variation might be a small energy transfer function which acted to transfer energy from that established by previous wind directions to that which is consistent with the latest wind velocity.

Swell did not decay fast enough in either of the cases studied. This can be caused by either the lack of a dissipation function or by improper dispersion. Because of the discrete definition of the spectrum, with all of the energy within a 30 degree sector concentrated along the central direction, waves from a single grid point are not allowed to disperse properly. When the swell component has traveled a distance of about three grid points from the location of its generation the value of the component should have decreased by approximately one-half. The remaining half of the energy should have spread into the surrounding grid points which are in the triangle between the 30 degree radial lines. If the fetch is quite small, say containing only one or two grid points, and has sharp sides, this assumption will, thus, cause forecasts for some grid points to be much too high and for other grid points much too low. The total energy in the entire area, however, should be correct. The only way that this total energy can be decreased is through some type of dissipation. Because such small sharp edged fetches seldom occur and do not seem to have occurred in either of the cases studied, this assumption does not appear to be at fault. The edges of the fetch are poorly defined so that all the surrounding grid points should be trading part of their energy with each other if the model allowed it. These trades should not change the total energy at any one grid point by a large percentage. If this were the problem, the final significant height field would be quite irregular; instead, the field is very easy to contour with smooth maxima.

A second dispersion error is caused by not having forecast low enough frequencies to be present. These lower frequencies travel more rapidly, thus passing the observing station faster. Along with this is the fact that the model propagates waves in accordance with linear wave theory, which may be slightly too low. As a more complete test of the effects of dispersion, two test forecasts were prepared for Case II. In the first of these, the assumption was made that the wind was calm after step 18 (00Z, December 18). A comparison of these results with the previous forecast is shown in Table 5-1 for grid point 73. This comparison shows that the changing wind direction was responsible for only a small part of the error. In the second test, besides the same assumption of a calm wind after step 18, the frequencies in step 17 were decreased by 1/4 of their value. This is a slight underestimate of the frequency shown in Figure 4-8(c) so that it results in a slight overestimate of the propagation velocity. These results are also shown in Table 5-1 and again account for another small part of the error. In both of these test forecasts the significant heights near grid point 73 decreased fairly evenly and regularly. Effectively, therefore, when high waves are experienced over a large area surrounding the location of interest, waves cannot propagate out of the region fast enough to cause the extremely rapid decays observed, although reasonably rapid decays, such as shown for ship J in Figure 4-5, can occur. One further test should be made in a final attempt to explain these errors in terms of dispersion. This would be to artificially decrease the frequencies throughout the entire computation. Until this is done dissipation cannot be proved conclusively.

Since the observed decay may not completely be explained by dispersion errors, the need for a dissipation function must be considered. As stated previously, the Neumann spectrum was not devised for this particular application. It already considers this dissipation term for the area of generation.

A simple dissipation function could be added very easily by increasing the tabulated values of the growth function and decreasing the various components. It should be noted that some dissipation function could be found which would reduce the errors in Case II to negligibility.

Table 5-1 Forecasts of Significant Height in feet for Grid Point 73 Assuming Special Conditions

Time Step	Observed	Regular Forecast	Calm Wind(1)	Calm Wind(1) (2) and Fast Propagation
18	35.3	43.6	43.6	42.1
19	28.8(3)	42.5	41.5	40.8
20	23.9(3)	41.8	40.7	40.7
21	20.6	43.0	42.0	39.9
22	19.5(3)	42.6	40.5	38.7
23	16.1(3)	41.7	39.3	38.7
24	13.6	41.5	38.9	37.8

(1) All winds after time step 18 are treated as calm.

(2) All frequencies decreased by 25% after time step 17 to match forecast errors and increase propagation velocity.

(3) Interpolated

5-3 OUTLOOK

One of the major objectives of the present paper is to define a numerical prediction model that will aid the future development of wind-wave forecasting through objectivity. It should be relatively easy to try other possible spectra besides the one used and conduct an extensive verification by comparison with observations. Addition of the effect of the sea-air temperature difference and other stability and atmospheric turbulence criteria on generating waves should be a worthwhile improvement. Dissipation functions can be easily tested.

The problem of specifying the initial conditions is quite serious for short range forecasts. For example as shown in Figure 4-7, it took a day of forecasting to catch up with an initial 12 foot error in significant height. The energy that could not have come from a single particular wind speed should not be dropped. It might help if a check were made on the winds at surrounding grid points and earlier times and using one of these values to improve the initial estimate. Another simpler and possibly more promising solution might be to estimate the principal direction of the initial sea and use this with the lowest wind speed which would generate a fully developed spectrum having the estimated significant height. If this were tried, no initial wind conditions would be needed.

The various parameters of the model, such as grid size and shape, time step length, and the method of specifying the spectrum, should be studied in some detail. Perhaps the grid size should be increased (more space between points) and the extra memory space thereby saved used to provide two tags for each component so that the exact distance past and to the side of each grid point could be specified. This system might allow more accuracy in location. However, this increase in accuracy will be limited unless the curvature of the earth is also considered. As suggested previously, other methods of specifying the spectra should be considered.

Most of the possible practical applications of the model include either hindcast statistics or forecasting. For these purposes, a self correcting system should be added so that all wave observations can be added as available. Other more complete methods of specifying the final forecast are needed. However, ship motions and other similar parameters which depend on the spectrum can be programmed so that the final output is the desired parameter directly.

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APPENDIX A

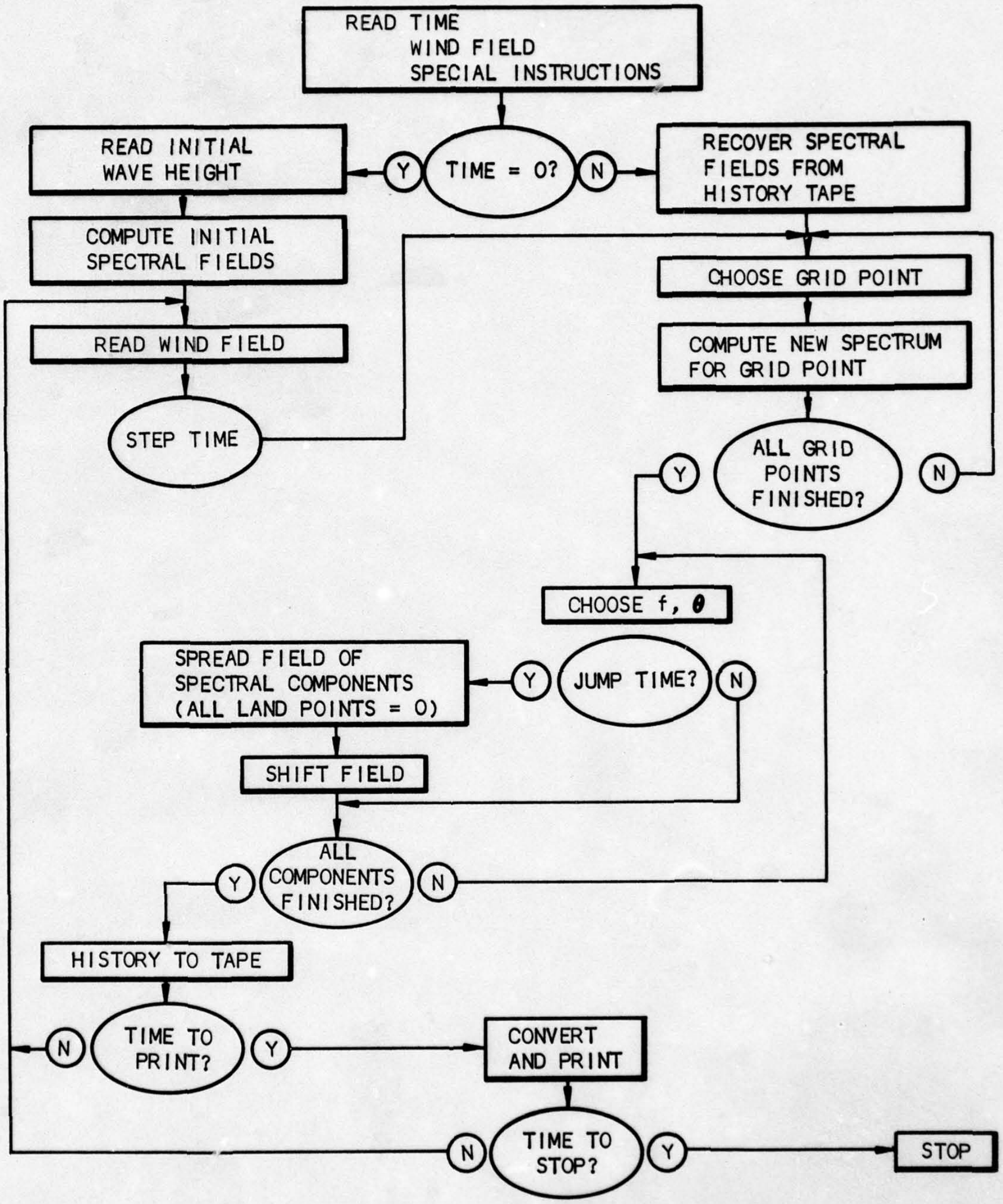


Figure A-1 Master Flow Diagram

APPENDIX B PROGRAM

I DECK STACKING

Monitor Cards

Program

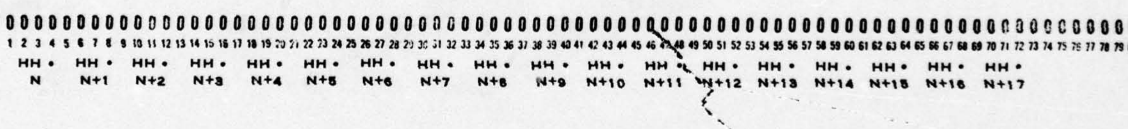
Data Cards

	1:	Title Card: Case number ending in Col. 8
	2:	Print Interval: Interval for print-out time in Cols. 2 - 12*.
	3:	End Card: Number of final step in Col. 2 - 12*, number of special cards ending in Col. 15.
	4:	Time: First time step number
	5. thru 64:	Wind Field: Card format specified below
	65 thru X:	Special Cards (if specified in Card 3) time step in Col 1-8*, Grid point number in Col. 14 - 16
	X thru X + 28:	Initial wave fields (if time = 0): Card format specified below
	X + 29:	Time
	X + 30 thru XX:	Wind Field

repeat for all time steps

II CARD FORMATS

CARD A. WIND FIELDS



CARD B. INITIAL WAVE FIELD

where:

VV. = wind speed in
DDD. = wind direction in degrees
HH. = significant wave height

at location N+M

N+M ≦ 519 = relative grid point number over water.

*Use decimal point.

Table B-1 Program

```
*      FORTRAN                                                          2BAE0010
C      MAIN PROGRAM. L. BAER,WAVE FCSTG2                                2BAE0020
       COMMON SPACE,BIGFLD,E,STORGE,EMAX,DIR,FREQ,DELTFQ,               2BAE0030
     2TABCOL,TABROW,TABLE,JUMP,TIME,MINDIS,NEVNTB,                      2BAE0040
     2NODTAB                                                            2BAE0050
       DIMENSION SPACE(864),BIGFLD(864),E(10,12),EMAX(10,12),           2BAE0060
     2STORGE(20760),DIR(12),FREQ(10),DELTFQ(10),TABCOL(25),             2BAE0070
     2TABROW(11),TABLE(25,11),WINDDR(864),WINDSP(864),                  2BAE0080
     2MINDIS(12),NEVNTB(12),NODTAB(12)                                  2BAE0090
       DIMENSION TIMEL(100),LOCGRD(100),FIRST(519)                      2BAE0100
       EQUIVALENCE(WINDDR,SPACE),(WINDSP,BIGFLD)                        2BAE0110
       DIR(1)=0.                                                        2BAE0120
       DIR(2)=30.                                                       2BAE0130
       DIR(3)=60.                                                       2BAE0140
       DIR(4)=90.                                                       2BAE0150
       DIR(5)=120.                                                      2BAE0160
       DIR(6)=150.                                                      2BAE0170
       DIR(7)=180.                                                      2BAE0180
       DIR(8)=210.                                                      2BAE0190
       DIR(9)=240.                                                      2BAE0200
       DIR(10)=270.                                                     2BAE0210
       DIR(11)=300.                                                     2BAE0220
       DIR(12)=330.                                                     2BAE0230
       FREQ(1)=.35                                                      2BAE0240
       FREQ(2)=1./5.31                                                  2BAE0250
       FREQ(3)=1./7.77                                                  2BAE0260
       FREQ(4)=1./10.23                                                 2BAE0270
       FREQ(5)=1./12.69                                                 2BAE0280
       FREQ(6)=1./15.15                                                 2BAE0290
       FREQ(7)=1./17.61                                                 2BAE0300
       FREQ(8)=1./20.07                                                 2BAE0310
       FREQ(9)=1./22.53                                                 2BAE0320
       FREQ(10)=.04                                                     2BAE0330
       DELTFQ(1)=.20                                                    2BAE0340
       DELTFQ(2)=.5*(FREQ(1)-FREQ(3))                                   2BAE0350
       DELTFQ(3)=.5*(FREQ(2)-FREQ(4))                                   2BAE0360
       DELTFQ(4)=.5*(FREQ(3)-FREQ(5))                                   2BAE0370
       DELTFQ(5)=.5*(FREQ(4)-FREQ(6))                                   2BAE0380
       DELTFQ(6)=.5*(FREQ(5)-FREQ(7))                                   2BAE0390
       DELTFQ(7)=.5*(FREQ(6)-FREQ(8))                                   2BAE0400
       DELTFQ(8)=.5*(FREQ(7)-FREQ(9))                                   2BAE0410
       DELTFQ(9)=.5*(FREQ(8)-FREQ(10))                                  2BAE0420
       DELTFQ(10)=.5*(FREQ(9)-(1./27.46))                               2BAE0430
       TABCOL(1)=0.                                                     2BAE0440
       TABCOL(2)=1.                                                     2BAE0450
       TABCOL(3)=5.                                                     2BAE0460
       TABCOL(4)=10.                                                    2BAE0470
       TABCOL(5)=15.                                                    2BAE0480
       TABCOL(6)=20.                                                    2BAE0490
       TABCOL(7)=25.                                                    2BAE0500
       TABCOL(8)=30.                                                    2BAE0510
       TABCOL(9)=35.                                                    2BAE0520
       TABCOL(10)=40.                                                   2BAE0530
```

Table B-1 Program (Continued)

```
      TABCOL(11)=45.                                                    2BAE0540
      TABCOL(12)=50.                                                    2BAE0550
      TABCOL(13)=60.                                                    2BAE0560
      TABCOL(14)=70.                                                    2BAE0570
      TABCOL(15)=80.                                                    2BAE0580
      TABCOL(16)=90.                                                    2BAE0590
      TABCOL(17)=100.                                                   2BAE0600
      TABCOL(18)=115.                                                   2BAE0610
      TABCOL(19)=130.                                                   2BAE0620
      TABCOL(20)=145.                                                   2BAE0630
      TABCOL(21)=160.                                                   2BAE0640
      TABCOL(22)=175.                                                   2BAE0650
      TABCOL(23)=200.                                                   2BAE0660
      TABCOL(24)=250.                                                   2BAE0670
      TABCOL(25)=400.                                                   2BAE0680
      TABROW(1)=16.88                                                   2BAE0690
      TABROW(2)=23.6                                                    2BAE0700
      TABROW(3)=30.4                                                    2BAE0710
      TABROW(4)=37.1                                                    2BAE0720
      TABROW(5)=43.9                                                    2BAE0730
      TABROW(6)=50.6                                                    2BAE0740
      TABROW(7)=57.4                                                    2BAE0750
      TABROW(8)=64.1                                                    2BAE0760
      TABROW(9)=74.3                                                    2BAE0770
      TABROW(10)=84.4                                                   2BAE0780
      TABROW(11)=94.5                                                   2BAE0790
      DO 1 N=1,25                                                       2BAE0800
      DO 1 L=1,11                                                       2BAE0810
    1 TABLE(N,L)=0.                                                     2BAE0820
      TABLE(1,1)=.1                                                     2BAE0830
      TABLE(1,2)=.15                                                    2BAE0840
      TABLE(1,3)=.2                                                     2BAE0850
      TABLE(1,4)=.35                                                    2BAE0860
      TABLE(1,5)=.5                                                     2BAE0870
      TABLE(1,6)=.7                                                     2BAE0880
      TABLE(1,7)=1.                                                     2BAE0890
      TABLE(1,8)=1.5                                                    2BAE0900
      TABLE(1,9)=2.0                                                    2BAE0910
      TABLE(1,10)=3.1                                                   2BAE0920
      TABLE(1,11)=4.5                                                   2BAE0930
      TABLE(2,2)=.6                                                     2BAE0940
      TABLE(2,3)=1.7                                                    2BAE0950
      TABLE(2,4)=1.8                                                    2BAE0960
      TABLE(2,5)=2.0                                                    2BAE0970
      TABLE(2,6)=2.5                                                    2BAE0980
      TABLE(2,7)=3.                                                     2BAE0990
      TABLE(2,8)=3.5                                                    2BAE1000
      TABLE(2,9)=4.0                                                    2BAE1010
      TABLE(2,10)=5.3                                                   2BAE1020
      TABLE(2,11)=7.                                                    2BAE1030
      TABLE(3,4)=3.2                                                    2BAE1040
      TABLE(3,5)=3.4                                                    2BAE1050
      TABLE(3,6)=3.8                                                    2BAE1060
      TABLE(3,7)=4.                                                     2BAE1070
```

Table B-1 Program (Continued)

```
      TABLE(3,8)=4.5                                                    2BAE1080
      TABLE(3,9)=6.                                                     2BAE1090
      TABLE(3,10)=8.7                                                   2BAE1100
      TABLE(3,11)=12.                                                   2BAE1110
      TABLE(4,4)=2.                                                     2BAE1120
      TABLE(4,5)=4.4                                                    2BAE1130
      TABLE(4,6)=4.5                                                    2BAE1140
      TABLE(4,7)=4.5                                                    2BAE1150
      TABLE(4,8)=5.                                                     2BAE1160
      TABLE(4,9)=7.5                                                    2BAE1170
      TABLE(4,10)=11.                                                   2BAE1180
      TABLE(4,11)=15.                                                   2BAE1190
      TABLE(5,5)=5.                                                     2BAE1200
      TABLE(5,6)=5.                                                     2BAE1210
      TABLE(5,7)=5.                                                     2BAE1220
      TABLE(5,8)=5.4                                                    2BAE1230
      TABLE(5,9)=8.                                                     2BAE1240
      TABLE(5,10)=12.                                                   2BAE1250
      TABLE(5,11)=17.                                                   2BAE1260
      TABLE(6,5)=5.                                                     2BAE1270
      TABLE(6,6)=5.5                                                    2BAE1280
      TABLE(6,7)=6.                                                     2BAE1290
      TABLE(6,8)=6.4                                                    2BAE1300
      TABLE(6,9)=9.                                                     2BAE1310
      TABLE(6,10)=13.                                                   2BAE1320
      TABLE(6,11)=20.                                                   2BAE1330
      TABLE(7,5)=4.5                                                    2BAE1340
      TABLE(7,6)=5.9                                                    2BAE1350
      TABLE(7,7)=6.4                                                    2BAE1360
      TABLE(7,8)=6.9                                                    2BAE1370
      TABLE(7,9)=9.4                                                    2BAE1380
      TABLE(7,10)=14.                                                   2BAE1390
      TABLE(7,11)=23.                                                   2BAE1400
      TABLE(8,6)=6.6                                                    2BAE1410
      TABLE(8,7)=7.                                                     2BAE1420
      TABLE(8,8)=8.                                                     2BAE1430
      TABLE(8,9)=10.                                                    2BAE1440
      TABLE(8,10)=15.                                                   2BAE1450
      TABLE(8,11)=25.                                                   2BAE1460
      TABLE(9,6)=7.7                                                    2BAE1470
      TABLE(9,7)=8.                                                     2BAE1480
      TABLE(9,8)=9.                                                     2BAE1490
      TABLE(9,9)=10.4                                                   2BAE1500
      TABLE(9,10)=16.                                                   2BAE1510
      TABLE(9,11)=25.                                                   2BAE1520
      TABLE(10,6)=8.7                                                   2BAE1530
      TABLE(10,7)=9.1                                                   2BAE1540
      TABLE(10,8)=9.8                                                   2BAE1550
      TABLE(10,9)=10.7                                                  2BAE1560
      TABLE(10,10)=17.                                                  2BAE1570
      TABLE(10,11)=25.                                                  2BAE1580
      TABLE(11,6)=9.                                                    2BAE1590
      TABLE(11,7)=10.                                                   2BAE1600
      TABLE(11,8)=10.5                                                  2BAE1610
```

Table B-1 Program (Continued)

```
      TABLE(11,9)=11.                                                   2BAE1620
      TABLE(11,10)=17.5                                                 2BAE1630
      TABLE(11,11)=25.                                                  2BAE1640
      TABLE(12,6)=7.                                                    2BAE1650
      TABLE(12,7)=11.                                                   2BAE1660
      TABLE(12,8)=11.                                                   2BAE1670
      TABLE(12,9)=11.4                                                  2BAE1680
      TABLE(12,10)=18.                                                  2BAE1690
      TABLE(12,11)=25.                                                  2BAE1700
      TABLE(13,7)=12.                                                   2BAE1710
      TABLE(13,8)=12.                                                   2BAE1720
      TABLE(13,9)=12.                                                   2BAE1730
      TABLE(13,10)=18.5                                                 2BAE1740
      TABLE(13,11)=25.                                                  2BAE1750
      TABLE(14,7)=12.                                                   2BAE1760
      TABLE(14,8)=12.4                                                  2BAE1770
      TABLE(14,9)=12.4                                                  2BAE1780
      TABLE(14,10)=19.                                                  2BAE1790
      TABLE(14,11)=25.                                                  2BAE1800
      TABLE(15,7)=12.                                                   2BAE1810
      TABLE(15,8)=12.6                                                  2BAE1820
      TABLE(15,9)=12.8                                                  2BAE1830
      TABLE(15,10)=20.                                                  2BAE1840
      TABLE(15,11)=25.                                                  2BAE1850
      TABLE(16,7)=11.                                                   2BAE1860
      TABLE(16,8)=12.9                                                  2BAE1870
      TABLE(16,9)=13.2                                                  2BAE1880
      TABLE(16,10)=21.                                                  2BAE1890
      TABLE(16,11)=25.                                                  2BAE1900
      TABLE(17,7)=10.                                                   2BAE1910
      TABLE(17,8)=13.2                                                  2BAE1920
      TABLE(17,9)=13.8                                                  2BAE1930
      TABLE(17,10)=22.                                                  2BAE1940
      TABLE(17,11)=25.                                                  2BAE1950
      TABLE(18,8)=13.5                                                  2BAE1960
      TABLE(18,9)=14.2                                                  2BAE1970
      TABLE(18,10)=23.                                                  2BAE1980
      TABLE(18,11)=25.                                                  2BAE1990
      TABLE(19,8)=14.                                                   2BAE2000
      TABLE(19,9)=15.                                                   2BAE2010
      TABLE(19,10)=24.                                                  2BAE2020
      TABLE(19,11)=25.                                                  2BAE2030
      TABLE(20,8)=14.                                                   2BAE2040
      TABLE(20,9)=15.8                                                  2BAE2050
      TABLE(20,10)=25.                                                  2BAE2060
      TABLE(20,11)=25.                                                  2BAE2070
      TABLE(21,8)=13.                                                   2BAE2080
      TABLE(21,9)=17.                                                   2BAE2090
      TABLE(21,10)=25.                                                  2BAE2100
      TABLE(21,11)=25.                                                  2BAE2110
      TABLE(22,8)=10.                                                   2BAE2120
      TABLE(22,9)=20.                                                   2BAE2130
      TABLE(22,10)=25.                                                  2BAE2140
      TABLE(22,11)=25.                                                  2BAE2150
```

Table B-1 Program (Continued)

```
      TABLE(23,9)=23.
      TABLE(23,10)=25.
      TABLE(23,11)=25.
      TABLE(24,9)=25.
      TABLE(24,10)=25.
      TABLE(24,11)=25.
      TABLE(25,9)=25.
      TABLE(25,10)=25.
      TABLE(25,11)=25.
      MINDIS(1)=120
      MINDIS(2)=207.5
      MINDIS(3)=207.5
      MINDIS(4)=120
      MINDIS(5)=207.5
      MINDIS(6)=207.5
      MINDIS(7)=120
      MINDIS(8)=207.5
      MINDIS(9)=207.5
      MINDIS(10)=120
      MINDIS(11)=207.5
      MINDIS(12)=207.5
      NEVNTB(1)=32
      NEVNTB(2)=31
      NEVNTB(3)=-1
      NEVNTB(4)=-1
      NEVNTB(5)=-33
      NEVNTB(6)=-32
      NEVNTB(7)=-32
      NEVNTB(8)=-31
      NEVNTB(9)=1
      NEVNTB(10)=1
      NEVNTB(11)=33
      NEVNTB(12)=32
      NODTAB(1)=32
      NODTAB(2)=32
      NODTAB(3)=31
      NODTAB(4)=-1
      NODTAB(5)=-1
      NODTAB(6)=-33
      NODTAB(7)=-32
      NODTAB(8)=-32
      NODTAB(9)=-31
      NODTAB(10)=1
      NODTAB(11)=1
      NODTAB(12)=33
      READ INPUT TAPE 5,1000,NTITLE,TMPRNT,ENDTME,NSPECT,NTIME,
     1(WINDSP(N),WINDDR(N),N=1,519)
 1000 FORMAT(I8/F12.0/F12.0,I3/I8/(18F4.0))
      IF (NSPECT)4000,4000,4001
 4001 READ INPUT TAPE 5,4002,(TIMEL(K),LOCGRD(K),K=1,NSPECT)
 4002 FORMAT(F8.0,I8)
C     TO INSPECT COMPLETE SPECTRA, PUT NUMBER OF
C     POINTS TO BE COVERED AS NSPECT AND ADD A CARD
C     AFTER FIRST WINDFIELD FOR EACH POINT. MAX
```

Table B-1 Program (Continued)

```
C     NUMBER OF POINTS=100. PRINTOUT TIME ONLY                          2BAE2700
 4000 CALL SDH(31)                                                      2BAE2710
      REWIND 31                                                         2BAE2720
      IF (NTIME)2,3,2                                                   2BAE2730
    3 READ INPUT TAPE 5,2000,(FIRST(N),N=1,519)                         2BAE2740
 2000 FORMAT(18F4.1)                                                    2BAE2750
      TIME=0.                                                           2BAE2760
      DO 2020 I=1,20760                                                 2BAE2770
 2020 STORGE (I) = 0.                                                   2BAE2780
      DO 2009 NGRID=1,519                                               2BAE2790
      IF (WINDSP(NGRID)-10.)2009,2010,2010                              2BAE2800
 2010 IF (WINDSP(NGRID)-56.)2040,2040,2041                              2BAE2810
 2041 WRITE OUTPUT TAPE 6,502,TIME,NGRID,WINDSP(NGRID)                  2BAE2820
      WINDSP(NGRID)=56.                                                 2BAE2830
 2040 CALL SPREAD (NGRID,NGRID,0)                                       2BAE2840
      WINDSP(NGRID)=1.688944*WINDSP(NGRID)                              2BAE2850
      CALL COMPE(WINDSP(NGRID),WINDDR(NGRID),FIRST(NGRID))              2BAE2860
      CALL REPACK (NGRID,NGRID,0)                                       2BAE2870
 2009 CONTINUE                                                          2BAE2880
      GO TO 2050                                                        2BAE2890
 2    PRINT 500                                                         2BAE2900
 500  FORMAT(33H1 PLEASE MOUNT RESERVE TAPE ON C1)                      2BAE2910
      PAUSE                                                             2BAE2920
      REWIND 31                                                         2BAE2930
  101 DO 6 N=1,NTIME                                                    2BAE2940
    6 READ TAPE 31,TIME,STORGE                                          2BAE2950
 100  TIME= TIME + 1.                                                   2BAE2960
      IF(TIME-FLOATF(NTIME))7,8,7                                       2BAE2970
    7 CALL PDUMP                                                        2BAE2980
      GO TO 25                                                          2BAE2990
    8 DO 9 NGRID=1,519                                                  2BAE3000
      IF(WINDSP(NGRID)-10.) 9,10,10                                     2BAE3010
 10   IF(WINDSP(NGRID)-56.) 40, 40,41                                   2BAE3020
   41 WRITE OUTPUT TAPE 6,502,TIME,NGRID,WINDSP(NGRID)                  2BAE3030
  502 FORMAT(1HO/8HOTIME = F12.0,10HGRID PT = I8,8HSPEED = F12.2)       2BAE3040
      WINDSP(NGRID)=56.                                                 2BAE3050
 40   CALL SPREAD (NGRID,NGRID,0)                                       2BAE3060
      WINDSP(NGRID)=1.688944*WINDSP(NGRID)                              2BAE3070
      CALL COMPE(WINDSP(NGRID),WINDDR(NGRID),0)                         2BAE3080
      CALL REPACK (NGRID, NGRID, 0)                                     2BAE3090
    9 CONTINUE                                                          2BAE3100
      CALL PRPAGT                                                       2BAE3110
 2050 WRITE TAPE 31,TIME,STORGE                                         2BAE3120
      IF(MODF(TIME,TMPRNT))13,12,13                                     2BAE3130
C     PRINT ROUTINE BEGINS AT LOCATION 12                               2BAE3140
   12 DO 14 N=1,864                                                     2BAE3150
   14 SPACE (N)=0.                                                      2BAE3160
      DO 15 N=1,12                                                      2BAE3170
      DO 15 M=1,10                                                      2BAE3180
      CALL SPREAD(M,N,1)                                                2BAE3190
      DO 15 L=1,864                                                     2BAE3200
   15 SPACE(L)=SPACE(L)+BIGFLD(L)                                       2BAE3210
      DO 16 L=1,864                                                     2BAE3220
 16   SPACE(L) = 2.83*SQRTF(SPACE(L))                                   2BAE3230
```

Table B-1 Program (Continued)

```
      DO 17 M=1,17,16
      IF(M-1)19,19,18
   19 WRITE OUTPUT TAPE 6,20,NTITLE
   20 FORMAT(34H1BAER WAVE FORECAST   LEFT SECTION/6H CASE I8)
      GO TO 21
18    WRITE OUTPUT TAPE 6,22
   22 FORMAT(33H1BAER WAVE FORCAST  RIGHT SECTION)
   21 WRITE OUTPUT TAPE 6,23,TIME,(SPACE(N),SPACE(N+1),
     1SPACE(N+2),SPACE(N+3),SPACE(N+4),SPACE(N+5),SPACE(N+6),
     1SPACE(N+7),SPACE(N+8),SPACE(N+9),SPACE(N+10),SPACE(N+11),
     1SPACE(N+12),SPACE(N+13),SPACE(N+14),SPACE(N+15),N=M,864,
     132)
23    FORMAT(1H010X,11HTIME STEP  F12.0/(1H0/3X,16F7.1))
   17 CONTINUE
      IF (NSPECT)13,13,4009
4009  DO 4010 K=1,NSPECT
      IF (TIMEL(K)-TIME)4010,4012,4010
4012  CALL SPREAD (LOCGRD(K),LOCGRD(K),0)
      NGRID=LOCGRD(K)
      WRITE OUTPUT TAPE 6,4013,TIME,NGRID,((E(N,M),N=1,
     110),M=1,12)
4013  FORMAT(8H1SPECIAL/8H0TIME = F15.0,12HGRIDPOINT = I8/(5E23.8))
4010  CONTINUE
13    WRITE OUTPUT TAPE 6,24,TIME
24    FORMAT(1H0/1H0/1H0/11H0TIME STEP F12.0,8HFINISHED)
      IF (TIME-ENDTME) 30,25,25
   30 READ INPUT TAPE 5,31,NTIME,(WINDSP(N),WINDDR(N),N
     1=1,519)
31    FORMAT(I8/(18F4.0))
      GO TO 100
25    CALL UNLOAD(31)
      PRINT 501
501   FORMAT (32H1 PLEASE RESERVE TAPE ON UNIT C1)
      CALL EXIT
      END
*     FORTRAN
      SUBROUTINE COMPE(WINDSP,WINDDR,FIRST)
C     COMPE, SUBROUTINE TO COMPUTE ALL 120 NEW E VALUES
      COMMON SPACE,BIGFLD,E,STORGE,EMAX,DIR,FREQ,DELTFQ,
     2TABCOL,TABROW,TABLE,JUMP,TIME,MINDIS,NEVNTB,
     2NODTAB
      DIMENSION SPACE(864),BIGFLD(864),E(10,12),EMAX(10,12),
     2STORGE(20760),DIR(12),FREQ(10),DELTFQ(10),TABCOL(25),
     2TABROW(11),TABLE(25,11),DWNDDR(864),DWNDSP(864),
     2MINDIS(12),NEVNTB(12),NODTAB(12)
      EQUIVALENCE(DWNDDR,SPACE),(DWNDSP,BIGFLD)
      SIGMA=0.
      DO 200 N=1,10
      DO 200 M=1,12
  200 EMAX(N,M)=0.
      DO 210 JDIR=1,12
      SIGDR=ABSF(WINDDR-DIR(JDIR))-90.
      IF(SIGDR)202,202,205
  205 SIGDR=ABSF(WINDDR-360.-DIR(JDIR))-90.
```

Table B-1 Program (Continued)

```
      IF(SIGDR)202,202,206                                          2BAE3780
  206 SIGDR=ABSF(WINDDR+360.-DIR(JDIR))-90.                         2BAE3790
      IF(SIGDR)202,202,210                                          2BAE3800
  202 DO 204 I=1,10                                                 2BAE3810
  204 SIGMA=SIGMA+E(I,JDIR)                                         2BAE3820
      BETA=SIGDR+90.                                                2BAE3830
      IF(BETA-75.)215,215,216                                       2BAE3840
  216 DELDIR=0.52359878*(BETA-75.)/30.                              2BAE3850
      BETA=75.+(BETA-75.)/2.                                        2BAE3860
      GO TO 203                                                     2BAE3870
  215 DELDIR=0.52359878                                             2BAE3880
  203 DO 201 JFREQ=1,10                                             2BAE3890
  211 EMAX(JFREQ,JDIR)=(103.*EXPF(-2.*(32.16/(FREQ(JFREQ)*          2BAE3900
     16.2831853*WINDSP))**2)*DELTFQ(JFREQ)*DELDIR/(6.2831853        2BAE3910
     1*FREQ(JFREQ))**6)*(1.+(.5+0.82*EXPF(-0.5*(                    2BAE3920
     16.2831853*FREQ(JFREQ)*WINDSP/32.16)**4))*COSF(0.034907        2BAE3930
     1* BETA)+0.32*EXPF(-0.5*(6.2831853*FREQ(JFREQ)                 2BAE3940
     1*WINDSP/32.16)**4)*COSF(0.069813*BETA))                       2BAE3950
  201 CONTINUE                                                      2BAE3960
  210 CONTINUE                                                      2BAE3970
      IF (FIRST)300,300,301                                         2BAE3980
  301 TABVAL=(FIRST**2)/8.                                          2BAE3990
      GO TO 302                                                     2BAE4000
  300 DO 221 KCOL=1,25                                              2BAE4010
      IF(TABCOL(KCOL)-SIGMA)221,222,222                             2BAE4020
  221 CONTINUE                                                      2BAE4030
  222 DO 223 KROW=1,11                                              2BAE4040
      IF(TABROW(KROW)-WINDSP)223,224,224                            2BAE4050
  223 CONTINUE                                                      2BAE4060
  224 COL1=(TABLE(KCOL,KROW-1)-TABLE(KCOL-1,KROW-1                  2BAE4070
     1))*(SIGMA-TABCOL(KCOL-1))/(TABCOL(KCOL)-TABCOL                2BAE4080
     1(KCOL-1))+TABLE(KCOL-1,KROW-1)                                2BAE4090
      COL2=(TABLE(KCOL,KROW)-TABLE(KCOL-1,KROW))*                   2BAE4100
     1(SIGMA-TABCOL(KCOL-1))/(TABCOL(KCOL)-TABCOL                   2BAE4110
     1(KCOL-1))+TABLE(KCOL-1,KROW)                                  2BAE4120
      TABVAL=(COL2-COL1)*(WINDSP-TABROW(KROW-1))/                   2BAE4130
     2(TABROW(KROW)-TABROW(KROW-1))+COL1                            2BAE4140
  302 DO 230 L=1,10                                                 2BAE4150
      DO 230 K=1,12                                                 2BAE4160
      EMAX(L,K)=EMAX(L,K)-E(L,K)                                    2BAE4170
      IF (EMAX(L,K)) 231,230,230                                    2BAE4180
 231  EMAX(L,K)=0.                                                  2BAE4190
 230  CONTINUE                                                      2BAE4200
      SUM = 0.                                                      2BAE4210
C     CHOOSE DIR NEAR WINDDR                                        2BAE4220
      DO 240 JDIR=1,12                                              2BAE4230
      IF(DIR(JDIR)-WINDDR)240,241,241                               2BAE4240
  240 CONTINUE                                                      2BAE4250
  241 IF(JDIR-3)260,269,261                                         2BAE4260
  261 IF(JDIR-10)262,268,263                                        2BAE4270
  260 IF(JDIR-2)264,265,265                                         2BAE4280
  263 IF(JDIR-11)266,266,267                                        2BAE4290
  266 KA=10                                                         2BAE4300
      KB=12                                                         2BAE4310
```

Table B-1 Program (Continued)

```
      KC=9
      KD=1
      KE=8
      KF=2
      GO TO 270
  267 KA=11
      KB=1
      KC=10
      KD=2
      KE=9
      KF=3
      GO TO 270
  262 KA=JDIR-1
      KB=JDIR+1
      KC=JDIR-2
      KD=JDIR+2
      KE=JDIR-3
      KF=JDIR+3
      GO TO 270
  265 KA=1
      KB=3
      KC=12
      KD=4
      KE=11
      KF=5
      GO TO 270
  264 KA=12
      KB=2
      KC=11
      KD=3
      KE=10
      KF=4
      GO TO 270
  268 KA=9
      KB=11
      KC=8
      KD=12
      KE=7
      KF=1
      GO TO 270
  269 KA=2
      KB=4
      KC=1
      KD=5
      KE=12
      KF=6
  270 DO 242 JFREQ=1,10
      SUM=SUM+EMAX(JFREQ,JDIR)
      E(JFREQ,JDIR)=E(JFREQ,JDIR)+EMAX(JFREQ,JDIR)
      IF(SUM-TABVAL)243,245,244
  243 SUM=SUM+EMAX(JFREQ,KA)
      E(JFREQ,KA)=E(JFREQ,KA)+EMAX(JFREQ,KA)
      IF(SUM-TABVAL)246,245,247
  246 SUM=SUM+EMAX(JFREQ,KB)
```

Table B-1 Program (Continued)

```
      E(JFREQ,KB)=E(JFREQ,KB)+EMAX(JFREQ,KB)
      IF(SUM-TABVAL)248,245,249
  248 SUM=SUM+EMAX(JFREQ,KC)
      E(JFREQ,KC)=E(JFREQ,KC)+EMAX(JFREQ,KC)
      IF(SUM-TABVAL)250,245,251
  250 SUM=SUM+EMAX(JFREQ,KD)
      E(JFREQ,KD)=E(JFREQ,KD)+EMAX(JFREQ,KD)
      IF(SUM-TABVAL)252,245,253
  252 SUM=SUM+EMAX(JFREQ,KE)
      E(JFREQ,KE)=F(JFREQ,KE)+EMAX(JFREQ,KE)
      IF(SUM-TABVAL)254,245,255
  254 SUM=SUM+EMAX(JFREQ,KF)
      E(JFREQ,KF)=E(JFREQ,KF)+EMAX(JFREQ,KF)
      IF(SUM-TABVAL)242,245,257
  244 E(JFREQ,JDIR)=E(JFREQ,JDIR)-(SUM-TABVAL)
      GO TO 245
  247 E(JFREQ,KA)=E(JFREQ,KA)-(SUM-TABVAL)
      GO TO 245
  249 E(JFREQ,KB)=E(JFREQ,KB)-(SUM-TABVAL)
      GO TO 245
  251 E(JFREQ,KC)=E(JFREQ,KC)-(SUM-TABVAL)
      GO TO 245
  253 E(JFREQ,KD)=E(JFREQ,KD)-(SUM-TABVAL)
      GO TO 245
  255 E(JFREQ,KE)=E(JFREQ,KE)-(SUM-TABVAL)
      GO TO 245
  257 E(JFREQ,KF)=E(JFREQ,KF)-(SUM-TABVAL)
      GO TO 245
  242 CONTINUE
  245 RETURN
      END
*     FORTRAN
      SUBROUTINE PRPAGT
      COMMON SPACE,BIGFLD,E,STORGE,EMAX,DIR,FREQ,DELTFQ,
     2TABCOL,TABROW,TABLE,JUMP,TIME,MINDIS,NEVNTB,
     2NODTAB
      DIMENSION SPACE(864),BIGFLD(864),E(10,12),EMAX(10,12),
     2STORGE(20760),DIR(12),FREQ(10),DELTFQ(10),TABCOL(25),
     2TABROW(11),TABLE(25,11),WINDDR(864),WINDSP(864),
     2MINDIS(12),NEVNTB(12),NODTAB(12)
      EQUIVALENCE(WINDDR,SPACE),(WINDSP,BIGFLD)
      EVEN=MODF(TIME,2.)
      DO 601 MDIR=1,12
      DO 602 MFREQ=1,10
      CALL JUMPTM(FREQ(MFREQ),MINDIS(MDIR))
      IF(JUMP)602,604,602
  604 CALL SPREAD(MFREQ,MDIR,1)
      IF(EVEN)609,608,609
  608 LOCMOD=NEVNTB(MDIR)
      GO TO 610
  609 LOCMOD=NODTAB(MDIR)
  610 DO 605 MGRID=1,864
      NUGRID=MGRID-LOCMOD
      SPACE(MGRID)=BIGFLD(NUGRID)
```

Table B-1 Program (Continued)

```
  605 CONTINUE
      CALL REPACK(MFREQ,MDIR,1)
  602 CONTINUE
  601 CONTINUF
  611 RETURN
      END
*     FORTRAN
      SUBROUTINE JUMPTM(FREQCY,MNDIST)
C     IT IS TIME TO JUMP IF JUMP=0
      COMMON SPACE,BIGFLD,E,STORGE,EMAX,DIR,FREQ,DELTFQ,
     2TABCOL,TABROW,TABLE,JUMP,TIME,MINDIS,NEVNTB,
     2NODTAB
      DIMENSION SPACE(864),BIGFLD(864),E(10,12),EMAX(10,12),
     2STORGF(20760),DIR(12),FREQ(10),DELTFQ(10),TABCOL(25),
     2TABROW(11),TABLE(25,11),WINDDR(864),WINDSP(864),
     2MINDIS(12),NEVNTB(12),NODTAB(12)
      EQUIVALENCE(WINDDR,SPACE),(WINDSP,BIGFLD)
      DISMIN=MNDIST
      TRAVDS=3./FREQCY
      DSLAST=(TIME-1.)*TRAVDS
      PASTDS=MODF(DSLAST,DISMIN)
      IF(PASTDS+TRAVDS-DISMIN)1001,1002,1002
 1001 JUMP=1
      RETURN
 1002 JUMP=0
      RETURN
      END
*     FORTRAN
      FUNCTION LANDSE(MCNT)
      MWHOLE=MCNT/36
      MPART=XMODF(MCNT,36)
      LANDSE=LSHIFT(MWHOLE,MPART)
      RETURN
      END
*     FAP
       ENTRY SPREAD
       ENTRY REPACK
       ENTRY LSHIFT
SPREAD SXA     RETURN,1                SAVE INDICES
       SXA     RETURN+1,2
       SXA     RETURN+2,4
       CLA*    1,4
       STO     MFREQ                   MFREQ IF CODE 1, MGRID IF CODE0
       CLA*    2,4
       STO     MDIR
       CLA*    3,4                     TEST CODE
       TNZ     CODE1                   DO BIG FLD ON TRA
       CLA     MFREQ          MGRID
       SUB     F1D
       XCA
       MPY     F40A
       XCA
       STD     BASE0
       AXT     0,1                     IR1 TO 40
```

Table B-1 Program (Continued)

```
       AXT    0,2                 IR2 TO 120                    2BAE5940
BASEO  TXI    *+1,1,0             DECR FROM *-3                 2BAE5950
SPR    CAL    STORGE,1            PACKED WORD TO AC             2BAE5960
       ANA    MASKL               LEFT WORD IN AC LOGICAL       2BAE5970
       ARS    24                          TO AC ADDR            2BAE5980
       TSX    FLOAT,4                                           2BAE5990
       SUB    OCTF                                              2BAE6000
       STO    E,2                                               2BAE6010
       XCA                                                      2BAE6020
       FMP    E,2                                               2BAE6030
       STO    E,2                                               2BAE6040
       CAL    STORGE,1                                          2BAE6050
       ANA    MASKC               CENTER WORD                   2BAE6060
       ARS    12                                                2BAE6070
       TSX    FLOAT,4                                           2BAE6080
       SUB    OCTF                                              2BAE6090
       STO    E-1,2                                             2BAE6100
       XCA                                                      2BAE6110
       FMP    E-1,2                                             2BAE6120
       STO    E-1,2                                             2BAE6130
       CAL    STORGE,1                                          2BAE6140
       ANA    MASKR               RIGHT WORD                    2BAE6150
       TSX    FLOAT,4                                           2BAE6160
       SUB    OCTF                                              2BAE6170
       STO    E-2,2                                             2BAE6180
       XCA                                                      2BAE6190
       FMP    E-2,2                                             2BAE6200
       STO    E-2,2                                             2BAE6210
       TXI    *+1,1,1                                           2BAE6220
       TXI    *+1,2,3                                           2BAE6230
       TXL    SPR,2,119                                         2BAE6240
RETURN AXT    0,1                 ADDR FROM SPREAD   OR REPACK  2BAE6250
       AXT    0,2                           SPREAD+1            2BAE6260
       AXT    0,4                           SPREAD+2            2BAE6270
       TRA    4,4                 EXIT                          2BAE6280
CODE1  CLA    MDIR                SPREAD 864                    2BAE6290
       SUB    F1D                                               2BAE6300
       XCA                                                      2BAE6310
       MPY    F10A                                              2BAE6320
       XCA                                                      2BAE6330
       ADD    MFREQ                                             2BAE6340
       SUB    F1D                                               2BAE6350
       STZ    WORK                CHOOSE MASK ROUTINE           2BAE6360
       STD    WORK                                              2BAE6370
       CLM                                                      2BAE6380
       LDQ    WORK                                              2BAE6390
       LLS    0                                                 2BAE6400
       DVP    OCT3D               REMAINDER IN AC DECR          2BAE6410
       STO    WORK                                              2BAE6420
       CLM                                                      2BAE6430
       LLS    18                                                2BAE6440
       XCA                                                      2BAE6450
       STD    BASE1                                             2BAE6460
       CLA    WORK                                              2BAE6470
```

Table B-1 Program (Continued)

```
         ARS    18                                                   2BAE6480
         TZE    LMASK         NO REMAINDER, CHOOSE LEFT WORD         2BAE6490
         SUB    OCT1A                                                2BAE6500
         TNZ    RMASK         TRA IF REM=2, CHOOSE RIGHT WORD        2BAE6510
         CLA    ADMSKC        REM=1, CHOOSE CENTER WORD              2BAE6520
         STA    MSKPL                                                2BAE6530
         CLA    AD12                                                 2BAE6540
         STA    SHFTPL                                               2BAE6550
         TRA    THENSP                                               2BAE6560
RMASK    CLA    ADMSKR                                               2BAE6570
         STA    MSKPL                                                2BAE6580
         CLA    AD0                                                  2BAE6590
         STA    SHFTPL                                               2BAE6600
         TRA    THENSP                                               2BAE6610
LMASK    CLA    ADMSKL                                               2BAE6620
         STA    MSKPL                                                2BAE6630
         CLA    AD24                                                 2BAE6640
         STA    SHFTPL                                               2BAE6650
THENSP   AXT    0,1                 FOR OUTPUT  TO 864               2BAE6660
         AXT    0,2                 FOR INPUT TO 20720               2BAE6670
BASE1    TXI    *+1,2,0             DECR FROM CODE1+13               2BAE6680
BIGSPR   SXD    INDEX,1                                              2BAE6690
         TSX    $LANDSE,4                                            2BAE6700
         TSX    INDEX,0                                              2BAE6710
         TNZ    BIGSEA              SEA IF 1 IN AC                   2BAE6720
         STZ    BIGFLD,1      LAND                                   2BAE6730
         TRA    TEST+1                                               2BAE6740
BIGSEA   CAL    STORGE,2                                             2BAE6750
MSKPL    ANA    0                   ADDR OF MASK FROM RMASK-2,+1,OR LMASK2BAE6760
SHFTPL   ARS    0             ADDR FROM RMASK+3 ETC                  2BAE6770
         TSX    FLOAT,4                                              2BAE6780
         SUB    OCTF                                                 2BAE6790
         STO    BIGFLD,1                                             2BAE6800
         XCA                                                         2BAE6810
         FMP    BIGFLD,1                                             2BAE6820
         STO    BIGFLD,1                                             2BAE6830
TEST     TXI    *+1,2,40                                             2BAE6840
         TXI    *+1,1,1                                              2BAE6850
         TXL    BIGSPR,1,863                                         2BAE6860
         TRA    RETURN                                               2BAE6870
REPACK   SXA    RETURN,1            SAVE INDICES                     2BAE6880
         SXA    RETURN+1,2                                           2BAE6890
         SXA    RETURN+2,4                                           2BAE6900
         CLA*   1,4                                                  2BAE6910
         STO    MFREQ               MFREQ FOR CODE1,MGRID FOR CODE0  2BAE6920
         CLA*   2,4                                                  2BAE6930
         STO    MDIR                                                 2BAE6940
         CLA*   3,4                 TEST CODE                        2BAE6950
         TNZ    RCODE1              DO BIG FLD ON TRA                2BAE6960
         CLA    MFREQ         MGRID                                  2BAE6970
         SUB    F1D                                                  2BAE6980
         XCA                                                         2BAE6990
         MPY    F40A                                                 2BAE7000
         XCA                                                         2BAE7010
```

AD-A072 225 LOCKHEED MISSILES AND SPACE CO INC SUNNYVALE CALIF F/G 4/2
AN EXPERIMENT IN NUMERICAL FORECASTING OF DEEP WATER OCEAN WAVE--ETC(U)
JUL 62 L BAER NONR-285(03)
UNCLASSIFIED LMSC/801296 NL

2 OF 2
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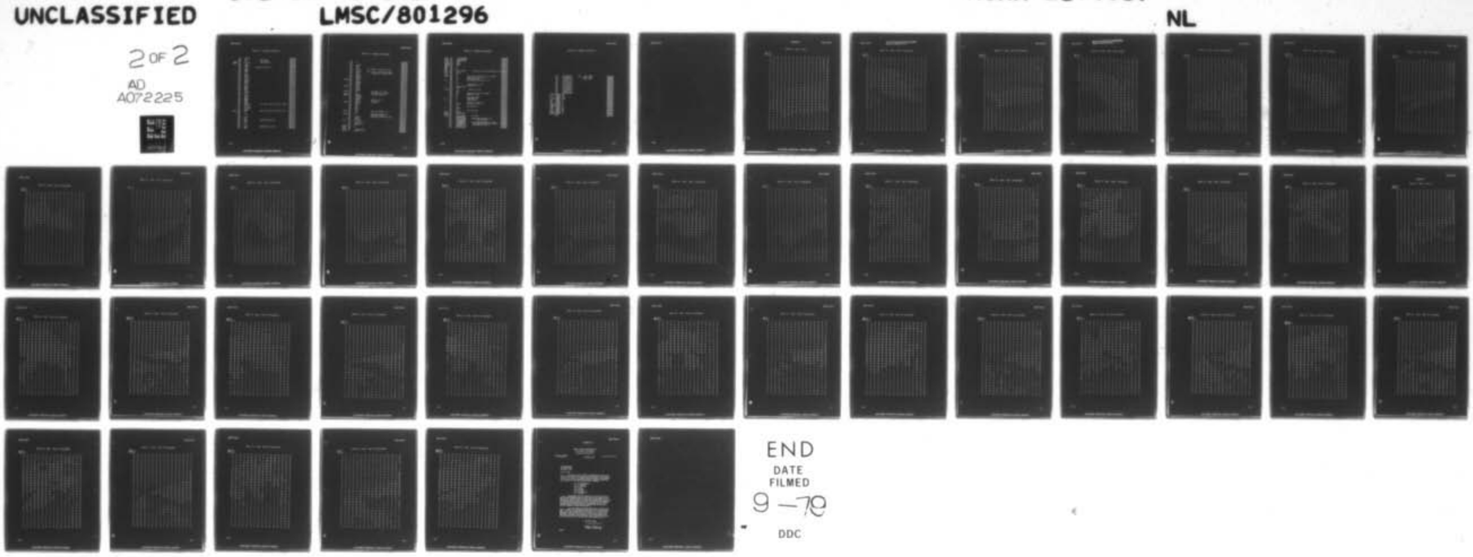

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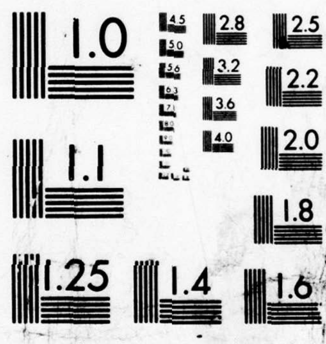
9 — 79
DDC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table B-1 Program (Continued)

```
         STD   RBASEO                                              2BAE7020
         AXT   0,1                IR1 TO 40                        2BAE7030
         AXT   0,2                IR2 TO 120                       2BAE7040
RBASEO   TXI   *+1,1,0            DECR FROM *-3                    2BAE7050
 REP     CLA   E,2                                                 2BAE7060
         TSX   $SQRT,4                                             2BAE7070
         ADD   OCTF                                                2BAE7080
         TSX   FIX,4        BINARY PT AFTER BIT 5                  2BAE7090
         STO   WORK                                                2BAE7100
         CAL   WORK                                                2BAE7110
         ANA   MASKR                                               2BAE7120
         ALS   24                                                  2BAE7130
         SLW   WORK                                                2BAE7140
         CLA   E-1,2                                               2BAE7150
         TSX   $SQRT,4                                             2BAE7160
         ADD   OCTF                                                2BAE7170
         TSX   FIX,4                                               2BAE7180
         STO   WORK+1                                              2BAE7190
         CAL   WORK+1                                              2BAE7200
         ANA   MASKR                                               2BAE7210
         ALS   12                                                  2BAE7220
         SLW   WORK+1                                              2BAE7230
         CLA   WORK                                                2BAE7240
         ADD   WORK+1                                              2BAE7250
         STO   WORK                                                2BAE7260
         CLA   E-2,2                                               2BAE7270
         TSX   $SQRT,4                                             2BAE7280
         ADD   OCTF                                                2BAE7290
         TSX   FIX,4                                               2BAE7300
         STO   WORK+1                                              2BAE7310
         CAL   WORK+1                                              2BAE7320
         ANA   MASKR                                               2BAE7330
         SLW   WORK+1                                              2BAE7340
         CLA   WORK                                                2BAE7350
         ADD   WORK+1                                              2BAE7360
         STO   STORGE,1           STO PACKED WORD CONTAINING 3 WORDS 2BAE7370
         TXI   *+1,1,1                                             2BAE7380
         TXI   *+1,2,3                                             2BAE7390
         TXL   REP,2,119                                           2BAE7400
         TRA   RETURN                                              2BAE7410
RCODE1   CLA   MDIR               REPACK 518 ROUTINE FROM 864 FIELD 2BAE7420
         SUB   F1D                                                 2BAE7430
         XCA                                                       2BAE7440
         MPY   F10A                                                2BAE7450
         XCA                                                       2BAE7460
         ADD   MFREQ                                               2BAE7470
         SUB   F1D                                                 2BAE7480
         STZ   WORK               CHOOSE MASK ROUTINE              2BAE7490
         STD   WORK                                                2BAE7500
         CLM                                                       2BAE7510
         LDQ   WORK                                                2BAE7520
         LLS   0                                                   2BAE7530
         DVP   OCT3D              REMAINDER IN AC DECR             2BAE7540
         STO   WORK                                                2BAE7550
```

Table B-1 Program (Continued)

```
        CLM                                                           2BAE7560
        LLS    18                                                     2BAE7570
        XCA                                                           2BAE7580
        STD    RBASE1                                                 2BAE7590
        CLA    WORK                                                   2BAE7600
        ARS    18                                                     2BAE7610
        TZE    RMASKL      NO REMAINDER, CHOOSE LEFT WORD             2BAE7620
        SUB    OCT1A                                                  2BAE7630
        TNZ    RMASKR      TRA IF REM=2, CHOOSE RIGHT WORD            2BAE7640
        CLA    AD12               REMAINDER=1, CHOOSE CENTER          2BAE7650
        STA    RSFTPL                                                 2BAE7660
        CLA    ADMSKC                                                 2BAE7670
        STA    RMSKPL                                                 2BAE7680
        TRA    THENPK                                                 2BAE7690
RMASKR  CLA    AD0                                                    2BAE7700
        STA    RSFTPL                                                 2BAE7710
        CLA    ADMSKR                                                 2BAE7720
        STA    RMSKPL                                                 2BAE7730
        TRA    THENPK                                                 2BAE7740
RMASKL  CLA    AD24                                                   2BAE7750
        STA    RSFTPL                                                 2BAE7760
        CLA    ADMSKL                                                 2BAE7770
        STA    RMSKPL                                                 2BAE7780
THENPK  AXT    0,1                FOR INPUT IR1 TO 864                2BAE7790
        AXT    0,2                FOR OUTPUT IR2 TO 20720             2BAE7800
RBASE1  TXI    *+1,2,0            DECR FROM RCODE+13                  2BAE7810
BIGPK   SXD    INDEX,1                                                2BAE7820
        TSX    $LANDSE,4                                              2BAE7830
        TSX    INDEX,0                                                2BAE7840
        TNZ    BGSEPK             SEA IF 1 IN AC                      2BAE7850
        TRA    RTEST+1            LAND POINT                          2BAE7860
BGSEPK  CLA    SPACE,1            SEA POINT                           2BAE7870
        TSX    $SQRT,4                                                2BAE7880
        ADD    OCTF                                                   2BAE7890
        TSX    FIX,4                                                  2BAE7900
        STO    WORK                                                   2BAE7910
        CAL    WORK                                                   2BAE7920
        ANA    MASKR                                                  2BAE7930
RSFTPL  ALS    0                  ADDR FROM RMASKR+1 ETC              2BAE7940
        SLW    WORK                                                   2BAE7950
RMSKPL  CAL    0                  ADDR FROM RMASKR+3 ETC              2BAE7960
        COM                       COMPLEMENT OF MASK                  2BAE7970
        ANA    STORGE,2           CLEAR PLACE FOR PACKED WORD         2BAE7980
        ACL    WORK                                                   2BAE7990
        SLW    STORGE,2                                               2BAE8000
RTEST   TXI    *+1,2,40                                               2BAE8010
        TXI    *+1,1,1                                                2BAE8020
        TXL    BIGPK,1,863                                            2BAE8030
        TRA    RETURN                                                 2BAE8040
MFREQ   HTR    *                                                      2BAE8050
MDIR    HTR    *                                                      2BAE8060
WORK    BSS    2                                                      2BAE8070
OCT3D   OCT    +000003000000                                          2BAE8080
OCT1A          +00000      1                                          2BAE8090
```

Table B-1 Program (Continued)

```
MASKL   OCT     -377700000000                                           2BAE8100
MASKC   OCT     +000077770000                                           2BAE8110
MASKR   OCT     +000000007777                                           2BAE8120
ADMSKL  HTR     MASKL                                                   2BAE8130
ADMSKC  HTR     MASKC                                                   2BAE8140
ADMSKR  HTR     MASKR                                                   2BAE8150
INDEX   HTR     0                                                       2BAE8160
AD12    HTR     12                                                      2BAE8170
AD0     HTR     0                                                       2BAE8180
AD24    HTR     24                                                      2BAE8190
OCTF    OCT     007000000000         TO MODIFY FLOATING WORD,BINARY PT 5-62BAE8200
F40A    PZE     40                                                      2BAE8210
F1D     PZE     0,0,1                                                   2BAE8220
F10A    PZE     10                                                      2BAE8230
FLOAT   ORA     C1             NBR TO BE FLOATED MUST BE IN AC ADDR     2BAE8240
        FAD     C1             FLOATED NBR STAYS IN AC                  2BAE8250
        TRA     1,4            RETURN FOR FLOAT                         2BAE8260
FIX     UFA     C1             NBR TO BE FIXED MUST BE IN AC            2BAE8270
        LRS     0                                                       2BAE8280
        ANA     C1+1                                                    2BAE8290
        LLS     0              FIXED NBR IN AC ADDR                     2BAE8300
        TRA     1,4            RETURN FOR FIX                           2BAE8310
C1      OCT     233000000000                                            2BAE8320
        OCT     77777                                                   2BAE8330
LSHIFT  CLA*    1,4              MWHOLE (0 TO 23)                       2BAE8340
        ARS     18                                                      2BAE8350
        ADD     LCNST                                                   2BAE8360
        STA     S1             ADDRESS OF WORD TO BE CHOSEN             2BAE8370
        CLA*    2,4            MPART (0 TO 35)                          2BAE8380
        ARS     18                                                      2BAE8390
        STA     S2             POSITION IN WORD                         2BAE8400
S1      CAL     0              ADDR FROM *-4                            2BAE8410
S2      ALS     0              ADDR FROM *-2                            2BAE8420
        PBT                                                             2BAE8430
        TRA     S3             0,LAND, PUT ZERO IN AC                   2BAE8440
        CLA     1OCTAD         1,SEA,PUT 1 IN AC                        2BAE8450
        TOV     *+1                                                     2BAE8460
        TRA     3,4            EXIT FOR SEA                             2BAE8470
S3      CLA     0OCTAD                                                  2BAE8480
        TOV     *+1                                                     2BAE8490
        TRA     3,4            EXIT FOR LAND                            2BAE8500
LCNST   HTR     LSTABL                                                  2BAE8510
1OCTAD  OCT     000001000000                                            2BAE8520
0OCTAD  HTR     0                                                       2BAE8530
LSTABL  OCT     +00000000000         BIT TABLE                          2BAE8540
        OCT     +000301034000                                           2BAE8550
        OCT     +006071740000        BINARY ONES REPRESENT SEA          2BAE8560
        OCT     +143770400003             ZEROS FOR LAND                2BAE8570
        OCT     -077600000037                                           2BAE8580
        OCT     -374000000777        POINTS ARE NUMBERED WEST TO EAST   2BAE8590
        OCT     -300000017776          THEN NORTH TO SOUTH, IE SECOND   2BAE8600
        OCT     +000000377774          ROW BEGISN WITH NO 33            2BAE8610
        OCT     +000007777740                                           2BAE8620
        OCT     +000777774001                                           2BAE8630
```

Table B-1 Program (Continued)

```
       OCT     -377777700177       NOTE    SEA = 519           2BAE8640
       OCT     -377776037777              LAND = 345           2BAE8650
       OCT     -377760777777             TOTAL = 864           2BAE8660
       OCT     -377417777777                                   2BAE8670
       OCT     -374777777777                                   2BAE8680
       OCT     -317777777776                                   2BAE8690
       OCT     +377777777703                                   2BAE8700
       OCT     -377777774017                                   2BAE8710
       OCT     -377777700377                                   2BAE8720
       OCT     -377776007777                                   2BAE8730
       OCT     -377740177777                                   2BAE8740
       OCT     -377003777777                                   2BAE8750
       OCT     -360077777777                                   2BAE8760
       OCT     -200000000000                                   2BAE8770
SPACE  COMMON  864                                             2BAE8780
BIGFLD COMMON  864                                             2BAE8790
E      COMMON  120                                             2BAE8800
STORGF COMMON  20760                                           2BAE8810
EMAX   COMMON  120                                             2BAE8820
DIR    COMMON  12                                              2BAE8830
FRFQ   COMMON  10                                              2BAE8840
DFLTFQ COMMON  10                                              2BAE8850
TABCOL COMMON  25                                              2BAE8860
TABROW COMMON  11                                              2BAE8870
TABLE  COMMON  275                                             2BAE8880
JUMP   COMMON  864                                             2BAE8890
TIME   COMMON  864                                             2BAE8900
MINDIS COMMON  12                                              2BAE8910
NEVNTB COMMON  12                                              2BAE8920
NODTAB COMMON  12                                              2BAE8930
       END                                                     2BAE8940
```

Table C-1 Data: Case I

BAER CASE 1
TIME 0
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14	14
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	16	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	210	240	210
-0	-0	-0	-0	-0	-0	-0	13	13	12	13	14	15	16	15	14
-0	-0	-0	-0	-0	-0	-0	360	360	360	150	150	210	210	210	180
-0	-0	-0	-0	-0	13	13	12	11	12	13	14	15	15	14	12
-0	-0	-0	-0	-0	360	360	150	150	150	150	150	210	180	180	150
-0	-0	13	13	13	13	11	12	11	12	12	13	14	14	14	11
-0	-0	60	60	60	60	150	150	150	150	150	150	180	180	180	150
-0	-0	14	15	14	14	13	13	12	12	12	13	13	13	13	11
-0	-0	60	60	60	360	150	150	150	150	150	150	150	150	150	150
-0	-0	15	15	15	15	14	13	12	12	12	12	13	13	12	11
-0	-0	60	30	120	120	150	150	120	150	150	150	150	150	150	150
-0	13	15	16	17	15	14	13	12	12	12	12	12	12	11	11
-0	270	240	240	210	150	150	150	150	150	150	150	150	150	150	120
-0	13	14	15	16	14	13	12	11	11	11	11	11	11	11	11
-0	240	240	240	210	180	150	150	150	150	150	150	150	150	150	150
-0	13	14	14	14	13	12	11	11	11	11	11	10	10	10	10
-0	210	210	240	210	180	150	150	150	150	150	150	150	150	150	150
-0	-0	13	13	13	12	11	10	10	10	10	10	10	10	10	10
-0	-0	180	210	180	180	150	150	150	150	150	150	150	150	150	1500
-0	-0	-0	-0	12	11	10	10	10	10	10	10	0	0	0	0
-0	-0	-0	-0	180	180	150	150	150	150	150	150	0	0	0	0
-0	-0	-0	-0	11	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	150	150	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	120	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 0
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
16	-0	-0	0	10	13	14	13	10	0	0	-0	-0	-0	-0	-0
240	-0	-0	0	240	300	330	330	30	0	0	-0	-0	-0	-0	-0
17	15	13	12	15	17	18	18	16	12	10	-0	-0	-0	-0	-0
270	240	210	210	270	330	330	330	360	60	90	-0	-0	-0	-0	-0
16	15	14	13	16	19	21	22	20	15	12	-0	-0	-0	-0	-0
270	270	240	210	270	330	330	330	330	60	60	-0	-0	-0	-0	-0
15	16	15	15	18	21	23	25	25	19	14	-0	-0	-0	-0	-0
270	240	240	240	270	300	330	330	330	30	60	-0	-0	-0	-0	-0
15	16	15	15	20	22	24	27	28	24	16	14	16	15	-0	-0
240	240	240	270	270	300	330	330	330	360	30	90	150	150	-0	-0
16	15	14	15	20	22	24	28	31	26	20	12	15	16	15	-0
210	240	240	270	270	300	330	330	330	3600	360	90	180	180	180	-0
15	13	12	15	20	22	23	27	31	30	22	15	15	-0	-0	-0
210	240	240	270	300	330	330	330	330	330	360	330	210	-0	-0	-0
12	10	0	11	16	21	22	25	29	29	23	17	16	-0	-0	-0
210	210	0	240	300	330	330	330	330	330	330	330	210	-0	-0	-0
10	0	0	0	10	16	21	22	24	25	22	18	17	-0	-0	-0
180	0	0	0	330	360	330	330	330	330	330	330	240	-0	-0	-0
10	0	0	0	0	10	15	17	18	19	18	18	16	14	-0	-0
150	0	0	0	0	360	360	330	330	330	330	300	270	210	-0	-0
10	0	0	0	0	0	0	10	10	12	14	15	14	13	-0	-0
150	0	0	0	0	0	0	360	330	330	330	300	270	240	-0	-0
10	10	10	10	0	0	0	0	0	0	0	11	11	10	10	-0
120	120	90	120	0	0	0	0	0	0	0	300	270	240	210	-0
11	11	11	10	0	0	0	0	0	0	0	0	0	0	0	-0
90	90	90	120	0	0	0	0	0	0	0	0	0	0	0	-0
11	11	10	10	0	0	0	0	0	0	0	0	0	0	0	-0
120	90	90	90	0	0	0	0	0	0	0	0	0	0	0	-0
10	10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
120	120	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 1
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0	0
-0	-0	-0	-0	-0	-0	-0	17	16	13	10	10	12	14	14	10
-0	-0	-0	-0	-0	-0	-0	360	360	360	360	210	210	210	210	210
-0	-0	-0	-0	-0	19	18	17	16	15	15	15	15	16	15	12
-0	-0	-0	-0	-0	360	360	180	210	210	210	210	210	210	210	210
-0	-0	20	22	20	19	18	17	16	16	15	15	16	17	15	10
-0	-0	360	30	60	120	150	180	210	180	180	180	210	210	180	180
-0	-0	20	20	21	19	18	16	16	15	14	14	15	16	15	10
-0	-0	30	30	60	120	120	120	150	150	180	180	180	180	150	150
-0	-0	13	10	20	20	17	16	15	13	13	12	14	15	13	0
-0	-0	360	360	90	150	120	120	120	150	150	150	150	150	150	0
-0	0	0	0	20	19	16	14	12	11	11	11	11	0	0	0
-0	0	0	0	180	180	150	120	120	120	150	150	150	0	0	0
-0	0	0	0	14	13	11	10	0	0	0	0	0	0	0	0
-0	0	0	0	180	150	150	120	0	0	0	0	0	0	0	0
-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	10
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	90
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	10	11	12
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	0	10	12	13	14
-0	-0	-0	-0	0	0	0	0	0	0	0	0	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	10	11	12	13	14	15
-0	-0	-0	-0	0	0	0	0	0	0	90	90	90	90	90	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

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Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 1
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
12	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	-0	-0
240	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	-0	-0
21	17	15	13	11	13	12	10	0	0	0	-0	-0	-0	-0	-0
240	210	210	240	300	300	300	330	0	0	0	-0	-0	-0	-0	-0
25	20	17	17	17	17	17	16	14	12	0	-0	-0	-0	-0	-0
240	240	240	240	270	300	330	330	330	360	0	-0	-0	-0	-0	-0
18	17	17	18	19	20	21	22	21	28	14	-0	-0	-0	-0	-0
240	240	240	240	270	270	300	330	330	330	30	-0	-0	-0	-0	-0
13	14	15	18	20	21	24	26	30	38	38	0	15	15	-0	-0
240	240	240	270	270	270	300	330	330	330	330	0	150	150	-0	-0
0	11	14	18	20	20	22	24	28	38	42	15	15	16	16	-0
0	240	240	270	270	270	300	330	330	330	330	270	180	180	180	-0
0	10	13	15	17	18	19	20	24	30	42	32	18	-0	-0	-0
0	210	240	270	270	300	300	330	330	330	330	300	210	-0	-0	-0
10	11	10	10	13	16	17	18	20	24	31	33	19	-0	-0	-0
210	210	240	270	300	300	330	330	330	330	300	300	240	-0	-0	-0
10	0	0	0	0	12	15	17	19	20	20	20	18	-0	-0	-0
180	0	0	0	0	360	360	360	330	330	300	270	240	-0	-0	-0
0	0	0	0	0	0	13	16	17	18	18	18	17	15	-0	-0
0	0	0	0	0	0	360	360	360	330	300	270	270	240	-0	-0
0	0	0	0	0	0	10	14	16	17	17	16	15	14	-0	-0
0	0	0	0	0	0	360	360	360	330	330	300	270	240	-0	-0
0	0	0	0	0	0	0	12	15	16	16	15	14	13	12	-0
0	0	0	0	0	0	0	360	360	360	330	300	300	270	240	-0
0	0	0	0	0	0	0	10	13	15	15	14	13	12	12	-0
0	0	0	0	0	0	0	360	360	360	360	360	330	300	270	-0
0	0	0	0	0	0	0	0	11	14	13	13	13	13	12	-0
0	0	0	0	0	0	0	0	30	360	360	360	360	330	300	-0
0	0	0	0	0	0	0	0	11	13	14	14	14	14	-0	-0
0	0	0	0	0	0	0	0	30	30	30	30	360	360	-0	-0
0	0	0	0	0	0	0	10	13	15	15	15	15	-0	-0	-0
0	0	0	0	0	0	0	30	30	30	30	30	30	-0	-0	-0
0	0	0	0	0	0	10	13	15	15	15	15	15	-0	-0	-0
0	0	0	0	0	0	60	30	30	30	30	30	30	-0	-0	-0
0	0	0	10	12	13	15	16	16	16	16	15	15	-0	-0	-0
0	0	0	60	60	60	60	60	30	30	30	30	30	-0	-0	-0
10	12	14	15	16	16	16	16	16	16	15	15	13	-0	-0	-0
90	90	60	60	60	60	60	60	60	30	30	30	30	-0	-0	-0
13	15	15	16	16	16	16	16	16	16	15	14	12	-0	-0	-0
90	90	60	60	60	60	60	60	60	60	30	30	30	-0	-0	-0
15	16	16	16	17	17	17	17	16	15	14	12	10	-0	-0	-0
90	90	60	60	60	60	60	60	60	60	60	30	30	-0	-0	-0
16	16	16	17	17	17	16	16	15	14	12	10	0	0	-0	-0
90	60	600	60	60	60	60	60	60	60	60	600	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 3
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12	11
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	-0	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14	15	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	210	210
-0	-0	-0	-0	-0	-0	-0	16	15	14	14	13	15	15	15	13
-C	-0	-0	-0	-0	-0	-0	360	30	30	30	30	210	210	210	210
-0	-0	-0	-0	-0	22	16	13	0	10	13	15	16	16	14	0
-0	-0	-0	-0	-0	30	30	30	0	210	210	210	210	210	180	0
-0	-0	22	27	25	18	14	10	0	10	14	15	16	15	14	0
-0	-0	30	30	60	60	60	90	0	180	180	180	180	180	150	0
-0	-0	23	24	22	21	17	13	11	12	14	15	15	15	13	0
-0	-0	30	30	60	90	120	120	150	180	150	150	150	150	150	0
-0	-0	13	19	0	22	18	15	12	13	14	15	14	14	14	12
-C	-0	330	330	0	150	150	120	150	150	150	120	120	120	120	120
-0	0	11	23	26	22	17	14	13	12	12	14	14	14	16	15
-0	0	300	270	240	180	150	150	150	150	150	120	120	120	120	120
-0	10	15	21	20	16	14	13	12	12	12	13	14	14	17	19
-0	240	270	240	210	180	150	150	150	150	120	90	120	120	120	120
-0	10	10	11	10	10	10	10	10	11	13	14	13	14	16	20
-0	210	240	240	210	150	150	150	150	120	120	90	90	90	90	120
-0	-0	0	0	0	0	0	0	0	11	14	15	13	12	14	17
-0	-0	0	0	0	0	0	0	0	120	120	90	90	120	120	120
-0	-0	-0	-0	0	0	0	0	0	10	14	15	13	10	10	11
-0	-0	-0	-0	0	0	0	0	0	120	120	90	90	90	120	120
-0	-0	-0	-0	0	0	0	0	0	10	14	16	14	0	0	0
-0	-0	-0	-0	0	0	0	0	0	90	90	90	90	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	13	16	14	10	0	0
-0	-0	-0	-0	0	0	0	0	0	0	90	60	90	90	0	0
-0	-0	-0	-0	14	11	0	0	0	0	12	15	15	11	0	0
-0	-0	-0	-0	120	120	0	0	0	0	60	60	60	60	0	0
-0	-0	-0	-0	16	15	12	0	0	0	10	15	15	12	0	0
-0	-0	-0	-0	120	120	90	0	0	0	60	60	60	60	0	0
-0	-0	-0	-0	18	17	16	10	0	0	10	13	16	13	0	0
-0	-0	-0	-0	120	90	90	60	0	0	60	60	60	90	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 3
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	0	0	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	0	-0
10	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	-0	-0
300	-0	-0	0	0	0	0	0	0	0	0	-0	-0	-0	-0	-0
14	13	12	12	11	0	0	0	0	0	0	-0	-0	-0	-0	-0
300	300	270	270	330	0	0	0	0	0	0	-0	-0	-0	-0	-0
16	17	16	15	12	10	12	13	10	10	0	-0	-0	-0	-0	-0
300	300	300	300	240	330	330	330	360	30	0	-0	-0	-0	-0	-0
18	19	20	18	13	13	19	24	22	19	16	-0	-0	-0	-0	-0
330	330	300	240	240	270	330	330	330	360	60	-0	-0	-0	-0	-0
20	24	30	25	15	19	26	31	32	31	25	17	0	10	-0	-0
330	240	240	240	270	270	330	330	330	330	30	90	0	150	-0	-0
21	25	28	23	18	21	27	31	33	34	32	20	10	19	19	-0
210	240	240	270	270	300	330	330	330	330	330	330	180	180	180	-0
17	17	18	18	18	21	26	30	33	37	40	30	25	-0	-0	-0
210	210	240	270	300	300	300	330	330	330	330	330	270	-0	-0	-0
10	0	10	12	15	17	20	25	30	35	40	36	28	-0	-0	-0
210	0	240	270	300	300	300	300	330	330	330	300	270	-0	-0	-0
0	0	0	0	0	12	16	19	25	31	34	34	28	-0	-0	-0
0	0	0	0	0	300	330	330	300	300	300	300	270	-0	-0	-0
0	0	0	0	0	0	12	15	20	25	26	26	25	22	-0	-0
0	0	0	0	0	0	360	360	330	330	300	300	270	270	-0	-0
0	0	0	0	0	0	10	13	15	18	20	20	18	16	-0	-0
0	0	0	0	0	0	30	360	360	330	330	300	330	300	-0	-0
0	0	0	0	0	0	11	13	14	14	14	14	13	12	11	-0
0	0	0	0	0	0	30	30	30	360	330	330	300	300	300	-0
11	0	0	0	0	10	12	12	12	12	12	12	10	0	0	-0
120	0	0	0	0	60	30	30	30	360	330	330	300	0	0	-0
15	11	0	0	10	11	11	11	11	10	10	0	0	0	0	-0
120	120	0	0	60	60	30	30	30	30	360	0	0	0	0	-0
18	12	0	0	0	10	10	0	0	0	0	0	0	0	-0	-0
120	90	0	0	0	60	30	0	0	0	0	0	0	0	-0	-0
15	10	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
120	120	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
120	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 6
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17	19
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	16	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13	17	19
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	210	210
-0	-0	-0	-0	-0	-0	-0	12	15	17	17	15	13	18	17	20
-0	-0	-0	-0	-0	-0	-0	360	360	330	330	330	360	180	180	210
-0	-0	-0	-0	-0	25	25	25	17	14	13	15	17	13	13	17
-0	-0	-0	-0	-0	330	330	330	330	330	330	180	180	180	180	180
-0	-0	23	25	24	20	19	14	13	13	17	20	13	12	11	13
-0	-0	30	360	30	60	60	60	120	150	150	180	150	150	150	150
-0	-0	18	24	22	23	17	17	14	15	18	14	10	0	0	0
-0	-0	30	30	30	90	90	90	120	150	1500	150	150	0	0	0
-0	-0	18	10	0	22	24	18	14	12	12	0	0	0	0	0
-0	-0	360	330	0	120	150	150	150	150	150	0	0	0	0	0
-0	0	0	0	15	22	21	15	10	0	0	0	0	0	0	0
-0	0	0	0	240	180	180	150	150	0	0	0	0	0	0	0
-0	0	0	13	20	20	14	0	0	0	0	0	0	0	0	0
-0	0	0	240	210	210	180	0	0	0	0	0	0	0	0	0
-0	0	0	12	13	0	0	0	0	0	0	0	0	0	0	0
-0	0	0	180	180	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	11	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	90	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	12	11	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	90	90	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 6
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	10	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	120	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	13	11	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	900	120	0	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	14	15	0	0	0	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	120	150	0	0	0	0	0	-0	-0	-0	0	-0
18	-0	-0	10	11	20	0	0	0	0	0	-0	-0	-0	-0	-0
270	-0	-0	270	210	150	0	0	0	0	0	-0	-0	-0	-0	-0
16	17	15	14	13	13	10	0	0	0	0	-0	-0	-0	-0	-0
270	270	270	270	240	210	180	0	0	0	0	-0	-0	-0	-0	-0
14	15	15	14	13	15	10	0	0	10	13	-0	-0	-0	-0	-0
300	300	300	300	300	270	240	0	0	30	60	-0	-0	-0	-0	-0
11	13	13	13	20	18	12	0	14	20	18	-0	-0	-0	-0	-0
300	330	330	300	240	240	270	0	360	30	60	-0	-0	-0	-0	-0
10	12	20	21	20	15	13	14	27	25	25	18	10	0	-0	-0
330	360	240	240	240	240	270	330	330	360	30	60	90	0	-0	-0
14	21	22	20	16	14	14	18	31	38	36	19	0	0	0	-0
360	240	240	240	240	270	300	330	330	330	360	360	0	0	0	-0
20	22	21	20	16	13	14	20	29	36	39	25	14	-0	-0	-0
210	210	240	240	270	270	300	330	330	330	330	300	270	-0	-0	-0
20	20	19	16	13	11	12	17	23	30	36	35	23	-0	-0	-0
210	210	240	270	300	330	330	330	330	330	330	300	270	-0	-0	-0
18	17	11	0	0	0	0	11	15	19	20	31	31	-0	-0	-0
180	180	180	0	0	0	0	330	330	330	300	300	300	-0	-0	-0
14	11	0	0	0	0	0	0	0	12	15	16	15	10	-0	-0
150	180	0	0	0	0	0	0	0	330	300	300	300	300	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 2
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20	21
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14	0	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	0	210
-0	-0	-0	-0	-0	-0	-0	19	20	21	24	22	20	15	13	14
-0	-0	-0	-0	-0	-0	-0	30	30	30	30	360	330	210	210	210
-0	-0	-0	-0	-0	30	29	27	21	18	20	10	0	0	0	12
-0	-0	-0	-0	-0	30	30	30	30	30	30	30	0	0	0	180
-0	-0	0	19	28	30	21	19	14	13	13	12	0	0	0	12
-0	-0	0	30	30	30	90	120	120	150	150	150	0	0	0	180
-0	-0	15	20	29	35	24	18	14	12	11	0	0	0	11	14
-0	-0	330	330	360	90	150	150	150	150	150	0	0	0	30	150
-0	-0	17	22	31	35	23	16	13	10	0	0	0	0	13	17
-0	-0	330	330	300	240	180	180	150	150	0	0	0	0	90	120
-0	0	12	20	25	25	18	13	0	0	0	0	0	0	15	20
-0	0	270	300	270	240	180	180	0	0	0	0	0	0	90	120
-0	0	11	15	19	17	12	0	0	0	0	0	0	0	14	20
-0	0	270	270	240	210	180	0	0	0	0	0	0	0	120	120
-0	0	0	11	12	10	0	0	0	0	0	0	0	0	13	20
-0	0	0	240	210	180	0	0	0	0	0	0	0	0	180	150
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	15	20
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	210	150
-0	-0	-0	-0	0	0	0	0	0	0	0	0	10	14	16	19
-0	-0	-0	-0	0	0	0	0	0	0	0	0	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	0	12	15	17	18
-0	-0	-0	-0	0	0	0	0	0	0	0	0	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	10	15	16	17	17
-0	-0	-0	-0	0	0	0	0	0	0	0	90	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	12	15	16	17	17
-0	-0	-0	-0	0	0	0	0	0	0	0	90	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	10	14	15	16	16	16
-0	-0	-0	-0	0	0	0	0	0	0	90	90	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	12	15	15	16	16	16
-0	-0	-0	-0	0	0	0	0	0	0	60	90	90	90	90	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

HAER CASE 1
TIME 9
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	0	16	19	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	0	150	180	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	10	20	21	18	0	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	270	210	180	180	0	0	0	-0	-0	-0	0	-0
21	-0	-0	14	18	21	21	16	0	0	0	-0	-0	-0	-0	-0
270	-0	-0	270	270	240	180	210	0	0	0	-0	-0	-0	-0	-0
21	21	21	21	21	21	21	15	0	0	10	-0	-0	-0	-0	-0
270	270	270	270	270	240	210	210	0	0	60	-0	-0	-0	-0	-0
13	20	21	22	20	20	19	15	0	14	17	-0	-0	-0	-0	-0
270	300	300	300	300	270	210	210	0	30	60	-0	-0	-0	-0	-0
9	14	20	21	20	20	19	11	17	23	25	-0	-0	-0	-0	-0
0	360	300	330	300	240	240	210	30	30	60	-0	-0	-0	-0	-0
10	18	21	21	21	20	17	13	25	25	40	35	20	11	-0	-0
360	30	30	240	240	240	270	360	360	30	30	60	90	150	-0	-0
21	22	21	21	20	18	16	17	26	41	43	24	0	0	0	-0
30	210	240	240	240	270	360	330	360	360	30	30	0	0	0	-0
20	20	20	17	15	15	16	17	24	42	44	29	22	-0	-0	-0
210	210	240	240	270	300	360	330	330	330	360	300	270	-0	-0	-0
15	17	15	10	0	10	13	16	20	40	45	41	31	-0	-0	-0
210	210	210	240	0	300	330	330	330	330	330	300	270	-0	-0	-0
14	15	13	0	0	0	10	13	17	30	40	38	27	-0	-0	-0
180	180	180	0	0	0	330	330	330	330	300	300	270	-0	-0	-0
13	13	10	0	0	0	0	12	15	22	30	29	21	13	-0	-0
150	150	150	0	0	0	0	330	330	330	300	300	270	270	-0	-0
15	14	12	0	0	0	0	10	13	17	25	22	14	11	-0	-0
150	150	150	0	0	0	0	330	330	330	330	300	270	270	-0	-0
18	17	15	0	0	0	0	0	12	14	17	15	12	0	0	-0
120	120	120	0	0	0	0	0	360	330	330	330	300	0	0	-0
25	17	16	0	0	0	0	0	10	12	13	12	0	0	0	-0
120	120	120	0	0	0	0	0	360	360	330	330	0	0	0	-0
21	20	16	0	0	0	0	0	0	10	10	0	0	0	0	-0
150	120	120	0	0	0	0	0	0	360	330	0	0	0	0	-0
21	19	16	0	0	0	0	0	0	0	0	0	0	0	-0	-0
150	120	120	0	0	0	0	0	0	0	0	0	0	0	-0	-0
20	18	15	12	10	0	0	0	0	0	0	0	0	-0	-0	-0
120	120	90	90	60	0	0	0	0	0	0	0	0	-0	-0	-0
19	17	15	13	11	10	10	0	0	0	10	10	11	-0	-0	-0
90	90	90	60	60	60	60	0	0	0	30	30	360	-0	-0	-0
18	17	15	14	12	11	11	13	10	11	11	11	12	-0	-0	-0
90	90	90	60	60	60	60	60	30	30	30	30	30	-0	-0	-0
17	16	15	15	13	12	12	12	11	12	12	12	13	-0	-0	-0
90	90	90	60	60	60	60	60	30	30	30	30	30	-0	-0	-0
17	16	15	15	14	13	13	12	12	13	13	13	15	-0	-0	-0
90	90	60	60	60	60	60	60	60	30	30	30	30	-0	-0	-0
16	16	15	15	14	14	13	13	13	13	14	15	15	-0	-0	-0
90	60	60	60	60	60	60	60	60	60	30	30	30	-0	-0	-0
16	16	16	15	15	14	14	14	14	14	15	15	16	16	-0	-0
90	60	60	60	60	60	60	60	60	60	30	30	30	30	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 12
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	18
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17	20	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	30	60
-0	-0	-0	-0	-0	-0	-0	24	24	20	16	14	0	20	20	21
-0	-0	-0	-0	-0	-0	-0	30	30	30	30	30	0	360	210	210
-0	-0	-0	-0	-0	30	30	29	27	24	22	16	0	20	20	18
-0	-0	-0	-0	-0	30	30	30	30	30	30	180	0	210	210	180
-0	-0	22	29	36	37	36	32	28	13	16	16	12	15	15	15
-0	-0	30	30	30	30	30	30	30	150	150	180	180	180	180	150
-0	-0	24	28	36	30	35	32	30	21	18	16	13	13	13	14
-0	-0	30	30	360	30	120	120	150	150	150	150	150	150	150	150
-0	-0	23	32	33	35	35	30	28	21	17	15	12	11	12	13
-0	-0	30	270	270	210	180	150	150	150	150	150	150	150	150	150
-0	0	0	22	33	31	24	18	16	14	12	10	10	0	10	12
-0	0	0	270	240	210	180	180	180	150	150	150	180	0	120	120
-0	0	0	13	23	20	16	13	10	0	0	0	0	0	10	11
-0	0	0	240	240	210	210	180	180	0	0	0	0	0	120	150
-0	0	0	0	10	11	11	0	0	0	0	0	0	10	11	10
-0	0	0	0	240	210	210	0	0	0	0	0	0	240	180	150
-0	-0	0	0	0	0	0	0	0	0	0	0	0	10	10	10
-0	-0	0	0	0	0	0	0	0	0	0	0	0	180	180	150
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	10	10	10	10	10
-0	-0	-0	-0	0	0	0	0	0	0	0	90	90	90	120	120
-0	-0	-0	-0	0	0	0	0	0	10	10	10	10	10	10	10
-0	-0	-0	-0	0	0	0	0	0	90	90	90	90	90	90	90
-0	-0	-0	-0	0	0	0	0	10	10	10	10	10	10	10	10
-0	-0	-0	-0	0	0	0	0	90	90	90	90	90	90	90	90
-0	-0	-0	-0	0	0	0	10	10	10	10	10	11	11	11	11
-0	-0	-0	-0	0	0	0	90	90	90	90	90	90	90	90	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 12
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	12	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	90	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	0	20	25	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	0	210	150	-0	-0	0	0	0	0	0	-0	-0
-0	-0	-0	0	15	25	26	25	15	0	0	-0	-0	-0	0	-0
-0	-0	-0	0	270	240	210	180	210	0	0	-0	-0	-0	0	-0
12	-0	-0	17	22	25	24	24	12	0	0	-0	-0	-0	-0	-0
270	-0	-0	270	270	240	240	210	210	0	0	-0	-0	-0	-0	-0
13	16	17	21	23	22	20	19	0	0	0	-0	-0	-0	-0	-0
270	270	270	270	270	2700	240	210	0	0	0	-0	-0	-0	-0	-0
0	14	17	20	18	14	10	15	0	12	17	-0	-0	-0	-0	-0
0	270	2700	270	270	270	240	210	0	30	60	-0	-0	-0	-0	-0
0	0	12	13	11	0	15	14	13	25	30	-0	-0	-0	-0	-0
0	0	210	270	270	0	240	210	30	30	30	-0	-0	-0	-0	-0
11	0	0	0	10	16	14	13	23	36	40	31	23	17	-0	-0
360	0	0	0	240	270	270	210	360	30	30	30	90	150	-0	-0
17	12	17	17	17	17	15	15	30	45	42	26	12	18	18	-0
60	90	240	240	240	270	300	300	360	360	30	360	120	180	180	-0
20	18	17	16	15	15	17	19	30	44	46	35	32	-0	-0	-0
210	210	210	240	270	270	300	330	330	330	330	300	210	-0	-0	-0
19	17	16	10	10	13	16	20	28	38	45	40	32	-0	-0	-0
210	180	210	210	240	270	300	330	330	330	300	300	240	-0	-0	-0
17	16	10	0	0	0	14	19	25	31	34	30	23	-0	-0	-0
180	180	180	0	0	0	300	330	330	330	300	270	240	-0	-0	-0
15	11	0	0	0	0	13	17	19	22	23	19	15	13	-0	-0
150	180	0	0	0	0	330	330	330	330	300	300	270	240	-0	-0
13	0	0	0	0	0	12	15	17	17	14	12	10	0	-0	-0
150	0	0	0	0	0	330	330	330	330	330	300	300	0	-0	-0
12	0	0	0	0	0	10	14	15	14	10	0	0	0	0	-0
120	0	0	0	0	0	360	330	330	330	330	0	0	0	0	-0
11	0	0	0	0	0	10	13	14	12	0	0	0	0	0	-0
120	0	0	0	0	0	30	360	330	330	0	0	0	0	0	-0
10	0	0	0	0	0	10	12	13	10	0	0	0	0	0	-0
120	0	0	0	0	0	30	360	360	330	0	0	0	0	0	-0
0	0	0	0	0	0	10	12	12	10	0	0	0	0	-0	-0
0	0	0	0	0	0	30	30	360	360	0	0	0	0	-0	-0
0	0	0	0	0	0	10	11	11	10	0	0	0	-0	-0	-0
0	0	0	0	0	0	30	30	30	360	0	0	0	-0	-0	-0
0	0	0	0	10	10	11	11	11	10	0	0	0	-0	-0	-0
0	0	0	0	60	60	30	30	30	30	0	0	0	-0	-0	-0
0	0	0	10	10	10	11	11	10	10	10	10	10	-0	-0	-0
0	0	0	60	60	60	30	30	30	30	30	360	360	-0	-0	-0
10	10	10	10	10	11	12	11	11	10	10	10	10	-0	-0	-0
90	90	90	60	60	60	60	30	30	30	30	30	360	-0	-0	-0
10	10	10	11	11	12	12	11	11	11	11	11	11	-0	-0	-0
90	90	60	60	60	60	60	60	60	30	30	30	360	-0	-0	-0
11	11	11	12	12	12	12	12	11	11	11	11	11	-0	-0	-0
90	60	60	60	60	60	60	60	60	60	30	30	30	-0	-0	-0
11	12	12	12	12	12	12	12	11	11	11	11	11	11	-0	-0
60	60	60	60	60	60	60	60	60	60	60	30	30	360	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 15
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	16	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	19
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	18
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11	11	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	30	30
-0	-0	-0	-0	-0	-0	-0	25	25	25	23	18	0	0	0	15
-0	-0	-0	-0	-0	-0	-0	30	30	30	30	30	0	0	0	210
-0	-0	-0	-0	-0	34	34	32	32	28	22	15	10	10	15	16
-0	-0	-0	-0	-0	30	30	30	30	30	30	360	210	210	210	210
-0	-0	22	29	35	40	29	25	24	20	19	19	15	15	16	16
-0	-0	30	30	30	30	30	60	90	120	150	150	180	210	210	180
-0	-0	24	25	28	28	24	25	26	20	18	18	17	15	14	15
-0	-0	30	30	30	360	30	120	120	120	150	150	180	180	150	150
-0	-0	14	16	16	20	22	26	22	18	17	16	15	13	12	15
-0	-0	30	30	300	300	210	180	150	150	150	150	150	180	60	150
-0	0	0	0	11	17	22	17	15	15	15	15	14	0	10	13
-0	0	0	0	270	270	240	210	180	180	150	150	150	0	30	90
-0	0	0	0	0	16	15	13	12	12	12	12	12	0	0	0
-0	0	0	0	0	240	210	210	210	180	180	150	180	0	0	0
-0	0	0	11	15	14	12	0	0	0	0	0	0	0	0	0
-0	0	0	210	210	210	210	0	0	0	0	0	0	0	0	0
-0	-0	0	13	16	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	180	180	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	14	0	0	0	0	0	0	0	10	12	13	15
-0	-0	-0	-0	150	0	0	0	0	0	0	0	90	120	90	90
-0	-0	+0	-0	10	0	0	0	0	0	10	14	15	18	19	18
-0	-0	-0	-0	120	0	0	0	0	0	90	90	90	90	90	90
-0	-0	-0	-0	0	0	0	0	0	10	13	16	18	20	21	20
-0	-0	-0	-0	0	0	0	0	0	90	60	60	90	90	90	90
-0	-0	-0	-0	0	0	0	0	10	11	13	15	16	17	18	18
-0	-0	-0	-0	0	0	0	0	90	90	60	60	60	60	60	60
-0	-0	-0	-0	0	0	0	0	10	12	13	13	14	14	14	15
-0	-0	-0	-0	0	0	0	0	90	90	60	60	60	60	60	60
-0	-0	-0	-0	0	0	10	10	11	12	12	12	12	12	13	13
-0	-0	-0	-0	0	0	90	90	90	60	60	60	60	60	60	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE I
TIME 15
RIGHT SECTIO

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	13	10	15	-0	-0	16	0	0	0	0	-0	-0
-0	-0	-0	-0	300	270	210	-0	-0	210	0	0	0	0	-0	-0
-0	-0	-0	21	20	20	20	20	18	15	0	-0	-0	-0	0	-0
-0	-0	-0	300	270	240	240	240	240	210	0	-0	-0	-0	0	-0
13	-0	-0	23	22	21	21	20	16	12	0	-0	-0	-0	-0	-0
270	-0	-0	270	270	240	240	240	240	240	0	-0	-0	-0	-0	-0
20	21	20	20	20	20	18	15	18	10	0	-0	-0	-0	-0	-0
270	270	270	270	270	240	240	240	240	240	0	-0	-0	-0	-0	-0
14	14	13	13	13	12	12	12	13	0	0	-0	-0	-0	-0	-0
270	270	270	270	270	270	240	240	240	0	0	-0	-0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	15	-0	-0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	30	-0	-0	-0	-0	-0
13	15	11	0	0	10	10	0	0	13	24	18	0	0	-0	-0
360	30	60	0	0	240	240	0	0	360	30	60	0	0	-0	-0
15	10	11	13	15	16	14	13	10	20	32	19	10	18	15	-0
30	30	240	240	240	240	270	300	330	360	360	30	90	120	150	-0
15	16	16	16	17	19	20	19	19	30	35	33	28	-0	-0	-0
210	240	240	240	270	270	300	330	330	360	360	360	60	-0	-0	-0
16	15	13	13	15	18	22	23	25	32	36	35	23	-0	-0	-0
210	210	240	240	270	300	300	330	330	330	330	330	300	-0	-0	-0
15	10	0	0	0	13	22	25	28	31	35	36	33	-0	-0	-0
210	180	0	0	0	300	330	330	3300	330	330	330	300	-0	-0	-0
15	0	0	0	0	0	19	25	28	30	32	33	32	30	-0	-0
180	0	0	0	0	0	330	330	330	330	330	330	300	270	-0	-0
15	0	0	0	0	0	14	23	26	25	28	28	25	21	-0	-0
150	0	0	0	0	0	330	330	330	330	330	330	330	300	-0	-0
15	0	0	0	0	0	10	17	22	22	20	20	16	0	0	-0
150	0	0	0	0	0	330	330	330	330	330	330	330	0	0	-0
11	0	0	0	0	0	0	12	14	16	14	12	0	0	0	-0
120	0	0	0	0	0	0	330	3300	330	330	330	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
15	14	12	10	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	90	90	0	0	0	0	0	0	0	0	0	-0	-0	-0
18	15	14	12	10	0	0	0	0	0	0	0	0	-0	-0	-0
90	60	90	90	90	0	0	0	0	0	0	0	0	-0	-0	-0
18	16	14	13	12	10	10	0	0	0	0	0	0	-0	-0	-0
90	60	60	90	60	60	60	0	0	0	0	0	0	-0	-0	-0
17	15	14	13	12	11	10	10	10	10	0	0	0	-0	-0	-0
60	60	60	60	60	60	60	60	60	60	0	0	0	-0	-0	-0
15	14	13	13	12	12	11	10	10	10	10	10	10	-0	-0	-0
60	60	60	60	60	60	60	60	60	60	60	30	30	-0	-0	-0
13	13	12	12	12	12	11	11	11	11	11	11	10	10	-0	-0
60	60	60	60	60	60	60	60	60	60	30	30	30	300	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 18
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	16	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	21
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	21
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	21	21	18
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30	60	30
-0	-0	-0	-0	-0	-0	-0	20	20	31	31	24	22	20	13	10
-0	-0	-0	-0	-0	-0	-0	30	30	60	60	60	60	60	60	210
-0	-0	-0	-0	-0	27	30	32	40	42	30	22	16	15	16	17
-0	-0	-0	-0	-0	30	30	30	30	60	60	60	180	150	180	180
-0	-0	25	26	31	38	50	48	40	40	32	23	18	17	17	18
-0	-0	30	30	360	30	30	60	60	120	150	180	180	150	150	150
-0	-0	26	30	37	48	36	30	36	32	24	19	15	13	15	18
-0	-0	30	30	360	360	360	60	120	150	150	180	180	150	150	150
-0	-0	20	22	28	28	22	25	31	24	18	15	0	0	0	17
-0	-0	30	360	330	330	300	210	180	180	180	180	0	0	0	150
-0	0	12	13	12	15	18	29	25	19	15	0	0	0	0	16
-0	0	30	360	330	270	240	210	210	210	210	0	0	0	0	180
-0	0	0	0	0	12	20	24	20	14	0	0	0	0	0	13
-0	0	0	0	0	240	240	210	210	210	0	0	0	0	0	180
-0	0	0	0	13	18	22	20	14	0	0	0	0	0	0	0
-0	0	0	0	240	210	210	210	210	0	0	0	0	0	0	0
-0	-0	0	0	11	16	17	14	0	0	0	0	0	0	0	0
-0	-0	0	0	210	180	180	150	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	10	10	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	150	120	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0.	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	10	10	10	10	10	10	10	10	10
-0	-0	-0	-0	0	0	0	90	90	90	90	90	90	90	90	60
-0	-0	-0	-0	0	0	0	10	10	11	11	10	10	10	10	10
-0	-0	-0	-0	0	0	0	90	90	90	90	90	90	90	90	60
-0	-0	-0	-0	0	0	0	10	10	11	11	11	11	11	11	11
-0	-0	-0	-0	0	0	0	90	90	90	90	90	90	90	60	60
-0	-0	-0	-0	0	0	0	10	10	10	10	11	11	11	11	11
-0	-0	-0	-0	0	0	0	90	90	90	90	90	90	60	60	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 13
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	10	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	210	0	0	-0	-0	-0
-0	-0	-0	-0	10	14	20	-0	-0	15	0	0	0	0	-0	-0
-0	-0	-0	-0	270	240	240	-0	-0	210	0	0	0	0	-0	-0
-0	-0	-0	16	19	26	25	19	17	14	0	-0	-0	-0	0	-0
-0	-0	-0	300	270	240	240	240	210	210	0	-0	-0	-0	0	-0
16	-0	-0	31	31	28	24	18	15	13	0	-0	-0	-0	-0	-0
300	-0	-0	300	270	240	240	240	240	210	0	-0	-0	-0	-0	-0
25	27	26	26	25	20	17	15	17	13	10	-0	-0	-0	-0	-0
270	300	300	270	270	240	240	240	210	210	240	-0	-0	-0	-0	-0
0	10	10	0	10	10	12	12	15	11	0	-0	-0	-0	-0	-0
0	270	270	0	270	240	240	240	210	210	0	-0	-0	-0	-0	-0
0	0	0	0	0	0	17	16	14	0	13	-0	-0	-0	-0	-0
0	0	0	0	0	0	240	240	210	0	30	-0	-0	-0	-0	-0
17	15	11	0	18	18	17	15	10	11	18	18	15	11	-0	-0
360	360	360	0	240	240	240	240	240	360	30	60	60	90	-0	-0
18	11	17	20	21	20	17	15	13	16	25	26	20	15	12	-0
360	330	240	240	240	240	270	270	300	330	30	60	90	120	150	-0
0	16	21	21	20	19	17	16	15	19	29	39	15	-0	-0	-0
0	240	240	240	240	270	270	300	300	360	360	30	60	-0	-0	-0
17	21	20	16	15	16	16	17	17	19	30	46	0	-0	-0	-0
210	240	240	240	270	270	330	330	330	330	360	330	0	-0	-0	-0
21	21	13	10	10	13	15	17	18	19	23	33	30	-0	-0	-0
180	210	210	240	270	330	330	330	330	330	330	330	300	-0	-0	-0
20	17	10	0	0	0	14	16	17	18	19	21	21	18	-0	-0
180	180	180	0	0	0	330	330	330	330	330	330	300	270	-0	-0
18	15	0	0	0	0	13	15	16	16	17	17	16	15	-0	-0
150	150	0	0	0	0	360	360	330	330	330	300	300	270	-0	-0
16	15	10	0	0	10	12	15	15	15	15	14	14	12	0	-0
150	150	150	0	0	30	360	360	360	330	330	300	300	300	0	-0
15	13	10	0	10	11	13	14	14	14	14	13	12	10	0	-0
150	150	150	0	60	30	360	360	360	360	330	330	300	270	0	-0
12	11	0	0	10	12	13	14	14	14	13	12	11	10	0	-0
180	150	0	0	60	30	30	360	360	360	330	330	330	360	0	-0
0	0	0	10	11	12	13	13	13	13	13	12	11	10	-0	-0
0	0	0	60	60	30	30	30	30	360	360	360	30	30	-0	-0
0	0	0	10	11	12	13	13	13	13	12	12	12	-0	-0	-0
0	0	0	60	60	60	30	30	30	30	30	30	60	-0	-0	-0
0	0	10	10	12	12	12	12	12	12	12	12	12	-0	-0	-0
0	0	60	60	60	60	30	30	30	30	30	60	60	-0	-0	-0
10	10	10	11	12	12	12	12	12	12	12	12	12	-0	-0	-0
90	60	60	60	60	60	60	30	30	60	60	60	60	-0	-0	-0
10	10	11	12	12	11	11	11	11	11	11	11	11	-0	-0	-0
60	60	60	60	60	60	60	60	60	60	60	60	60	-0	-0	-0
11	11	11	11	11	10	10	10	10	11	11	11	10	-0	-0	-0
60	60	60	60	60	60	60	60	60	60	60	60	60	-0	-0	-0
11	11	11	10	10	10	10	10	10	10	10	10	10	-0	-0	-0
60	60	60	60	60	60	60	60	60	60	60	60	60	-0	-0	-0
10	10	10	10	10	0	0	0	0	0	0	0	0	0	-0	-0
60	60	60	60	60	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

MAER CASE 1
TIME 21
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20	21	16
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	60	60	60
-0	-0	-0	-0	-0	-0	-0	19	20	28	31	29	29	26	20	13
-0	-0	-0	-0	-0	-0	-0	30	30	30	60	60	60	60	60	150
-0	-0	-0	-0	-0	27	31	33	40	41	40	30	0	0	0	13
-0	-0	-0	-0	-0	30	30	30	30	60	60	60	0	0	0	150
-0	-0	18	20	20	25	28	41	41	21	18	12	0	0	0	13
-0	-0	30	30	360	360	30	30	30	90	120	1500	0	0	0	150
-0	-0	15	14	15	22	40	23	21	25	21	14	0	0	0	13
-0	-0	30	360	330	360	30	330	30	150	150	150	0	0	0	120
-0	-0	10	0	10	16	20	24	25	25	18	15	0	0	0	14
-0	-0	360	0	330	300	330	270	210	210	180	180	0	0	0	150
-0	0	0	0	12	16	19	21	20	19	17	14	12	12	15	17
-0	0	0	0	300	300	270	240	210	210	210	180	180	210	210	210
-0	0	0	0	12	14	17	17	16	15	14	13	12	12	13	13
-0	0	0	0	270	270	240	240	210	210	210	180	180	180	210	210
-0	0	0	0	10	12	13	13	13	12	12	11	10	0	0	0
-0	0	0	0	240	240	240	240	210	210	210	210	180	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	10	11
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	10	12	14	16	17
-0	-0	-0	-0	0	0	0	0	0	0	0	90	90	90	60	60
-0	-0	-0	-0	0	0	0	0	0	0	11	13	15	18	20	20
-0	-0	-0	-0	0	0	0	0	0	0	90	90	90	60	60	60
-0	-0	-0	-0	0	0	0	0	0	0	12	15	17	20	21	22
-0	-0	-0	-0	0	0	0	0	0	0	90	90	90	60	60	60
-0	-0	-0	-0	0	0	0	0	0	0	11	14	16	18	20	20
-0	-0	-0	-0	0	0	0	0	0	0	90	90	90	60	60	60
-0	-0	-0	-0	0	0	0	0	0	0	0	10	12	13	14	15
-0	-0	-0	-0	0	0	0	0	0	0	0	90	90	60	60	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE 1
TIME 21
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	20	0	0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	180	0	0	-0	-0	-0
-0	-0	-0	-0	0	12	20	-0	-0	19	19	0	0	0	-0	-0
-0	-0	-0	-0	0	240	240	-0	-0	240	210	0	0	0	-0	-0
-0	-0	-0	0	14	20	22	21	20	30	13	-0	-0	-0	0	-0
-0	-0	-0	0	270	240	240	240	240	180	210	-0	-0	-0	0	-0
0	-0	-0	15	22	21	22	20	17	21	0	-0	-0	-0	-0	-0
0	-0	-0	270	240	240	240	240	240	210	0	-0	-0	-0	-0	-0
15	15	17	19	20	21	20	15	30	18	0	-0	-0	-0	-0	-0
300	300	300	270	270	240	240	240	210	210	0	-0	-0	-0	-0	-0
13	15	16	17	18	15	10	23	19	12	0	-0	-0	-0	-0	-0
270	300	270	270	240	240	240	210	210	210	0	-0	-0	-0	-0	-0
0	0	0	10	10	0	17	17	14	10	0	-0	-0	-0	-0	-0
0	0	0	270	300	0	240	240	210	210	0	-0	-0	-0	-0	-0
0	0	0	0	0	20	20	17	13	0	0	0	0	0	-0	-0
0	0	0	0	0	240	240	240	240	0	0	0	0	0	-0	-0
0	0	0	21	22	23	21	18	18	10	12	15	20	20	19	-0
0	0	0	240	240	240	240	270	300	330	360	30	30	90	120	-0
0	20	21	22	22	22	21	20	17	16	17	20	21	-0	-0	-0
0	210	240	240	240	240	270	300	330	330	360	360	360	-0	-0	-0
17	21	21	20	20	20	20	21	20	20	20	21	21	-0	-0	-0
180	210	210	210	240	270	300	330	330	330	330	360	330	-0	-0	-0
19	22	20	15	12	14	18	20	21	21	21	22	21	-0	-0	-0
150	180	180	180	240	300	300	330	330	330	330	330	330	-0	-0	-0
20	21	15	10	0	10	15	20	21	21	22	21	21	18	-0	-0
150	150	150	150	0	330	330	330	330	330	330	330	330	300	-0	-0
20	19	13	0	0	10	14	18	20	21	21	21	20	14	-0	-0
150	150	150	0	0	330	330	330	330	330	330	330	330	270	-0	-0
18	15	10	0	0	11	13	17	20	20	20	20	15	0	0	-0
150	150	120	0	0	360	360	330	330	330	330	330	330	0	0	-0
16	12	0	0	0	11	13	15	16	17	15	14	10	0	0	-0
180	150	0	0	0	30	360	360	330	330	330	360	330	0	0	-0
11	0	0	0	0	10	11	11	12	12	0	0	0	0	0	-0
180	0	0	0	0	60	30	360	360	360	0	0	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
16	13	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
60	60	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
20	18	15	11	0	0	0	0	0	0	0	0	0	-0	-0	-0
60	60	60	60	0	0	0	0	0	0	0	0	0	-0	-0	-0
22	21	18	15	13	11	0	0	0	0	0	0	0	-0	-0	-0
60	60	60	60	60	60	0	0	0	0	0	0	0	-0	-0	-0
20	20	17	16	14	11	0	0	0	0	0	0	0	-0	-0	-0
60	60	60	60	60	60	0	0	0	0	0	0	0	-0	-0	-0
15	15	13	13	11	0	0	0	0	0	0	0	0	0	-0	-0
60	60	60	60	60	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE
TIME 24
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	210	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	240
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22	22	18
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30	60	60
-0	-0	-0	-0	-0	-0	-0	21	30	31	32	31	32	32	19	20
-0	-0	-0	-0	-0	-0	-0	30	30	30	30	30	30	30	150	150
-0	-0	-0	-0	-0	23	30	33	36	39	40	40	40	21	19	19
-0	-0	-0	-0	-0	300	30	30	30	30	30	30	30	150	150	150
-0	-0	25	27	30	31	34	38	45	47	43	28	26	20	18	19
-0	-0	30	30	30	0	0	0	0	30	30	180	180	150	180	150
-0	-0	28	31	32	33	37	45	43	38	25	28	25	20	19	20
-0	-0	30	30	0	0	0	0	0	330	180	180	210	180	210	180
-0	-0	18	24	27	29	30	28	34	28	28	25	21	19	22	31
-0	-0	30	30	0	0	330	330	330	240	210	210	210	210	210	210
-0	0	10	11	15	18	19	20	22	22	21	20	17	17	18	20
-0	0	30	30	0	0	330	330	240	210	210	210	210	210	210	210
-0	0	0	0	0	15	20	20	16	15	15	15	14	15	17	18
-0	0	0	0	0	330	240	240	240	210	210	210	210	180	150	180
-0	0	0	0	10	15	14	10	0	10	12	13	13	15	17	17
-0	0	0	0	240	240	240	240	0	210	210	180	180	150	120	120
-0	-0	0	0	0	0	0	0	0	10	12	13	14	15	17	17
-0	-0	0	0	0	0	0	0	0	210	180	150	120	120	120	90
-0	-0	-0	-0	0	0	0	0	0	10	13	14	15	16	17	17
-0	-0	-0	-0	0	0	0	0	0	120	150	120	90	60	90	90
-0	-0	-0	-0	0	0	0	0	0	11	14	16	17	18	18	18
-0	-0	-0	-0	0	0	0	0	0	90	90	90	60	60	90	90
-0	-0	-0	-0	0	0	0	0	0	10	13	16	17	18	20	20
-0	-0	-0	-0	0	0	0	0	0	60	60	60	60	60	90	90
-0	-0	-0	-0	0	0	0	0	0	0	11	13	15	15	20	21
-0	-0	-0	-0	0	0	0	0	0	0	60	60	60	90	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	0	10	12	13	15
-0	-0	-0	-0	0	0	0	0	0	0	0	0	60	60	90	90
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	11	12
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	90	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table C-1 Data: Case I (Continued)

BAER CASE
TIME 24
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	14	19	10	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	210	180	210	-0	-0	-0
-0	-0	-0	-0	17	19	23	-0	-0	18	14	18	11	0	-0	-0
-0	-0	-0	-0	270	240	240	-0	-0	210	240	210	210	0	-0	-0
-0	-0	-0	22	13	25	26	26	24	19	18	-0	-0	-0	0	-0
-0	-0	-0	270	270	240	240	210	210	240	210	-0	-0	-0	0	-0
0	-0	-0	24	25	27	27	26	24	17	17	-0	-0	-0	-0	-0
0	-0	-0	270	270	240	240	240	240	210	210	-0	-0	-0	-0	-0
15	16	21	23	25	25	25	24	17	16	16	-0	-0	-0	-0	-0
240	270	270	270	270	240	240	270	210	210	210	-0	-0	-0	-0	-0
15	17	20	21	21	20	13	17	16	15	10	-0	-0	-0	-0	-0
270	270	300	270	270	270	270	240	210	210	210	-0	-0	-0	-0	-0
0	11	13	15	15	15	17	16	16	10	0	-0	-0	-0	-0	-0
0	300	300	3000	300	270	240	240	210	210	0	-0	-0	-0	-0	-0
0	0	0	0	0	10	17	15	15	0	0	0	0	0	-0	-0
0	0	0	0	0	300	240	240	240	0	0	0	0	0	-0	-0
0	0	0	0	17	16	16	15	12	11	0	0	0	0	10	-0
0	0	0	0	240	240	240	240	270	270	0	0	0	0	60	-0
15	18	18	17	16	14	13	13	14	15	13	10	10	-0	-0	-0
60	180	210	240	240	240	240	270	300	330	0	0	30	-0	-0	-0
22	20	17	15	12	11	12	13	15	16	13	15	16	-0	-0	-0
150	180	210	240	240	240	270	300	330	330	330	0	30	-0	-0	-0
23	19	14	11	0	0	10	12	14	15	16	17	16	-0	-0	-0
150	180	210	210	0	0	300	330	330	330	330	330	0	-0	-0	-0
25	18	13	0	0	0	0	10	13	15	16	16	16	17	-0	-0
150	150	210	0	0	0	0	0	330	330	330	330	330	300	-0	-0
26	17	12	0	0	0	0	0	12	14	15	15	15	15	-0	-0
150	150	180	0	0	0	0	0	0	0	0	330	330	300	-0	-0
23	15	12	0	0	0	0	0	11	13	13	13	13	12	0	-0
180	150	150	0	0	0	0	0	0	0	0	330	30	330	0	-0
18	14	10	0	0	0	0	0	11	12	12	11	10	0	0	-0
180	150	150	0	0	0	0	0	30	30	0	330	330	0	0	-0
16	12	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
150	120	0	0	0	0	0	0	0	0	0	0	0	0	0	-0
15	13	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
120	90	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
16	13	11	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	90	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
16	14	12	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	90	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
17	14	11	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	60	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
18	14	10	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	60	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
17	13	10	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	90	60	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
14	12	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
90	60	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
12	10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
60	60	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

APPENDIX D

Table D-1 Data: Case II

BAER CASE 2
TIME 0
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	27	25
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	33	[illegible]
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	31	31
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360	350
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	350
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	340
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	340
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	340
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	330
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	15	22	26
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	330	330
-0	-0	-0	-0	-0	-0	-0	21	27	27	25	22	21	22	24	23
-0	-0	-0	-0	-0	-0	-0	270	270	260	260	230	230	250	330	330
-0	-0	-0	-0	-0	20	22	24	22	19	19	19	20	20	20	15
-0	-0	-0	-0	-0	310	320	270	260	250	240	250	260	280	290	230
-0	-0	10	10	0	13	16	17	13	10	10	10	10	10	0	0
-0	-0	70	60	0	320	290	230	230	240	250	250	310	10	0	0
-0	-0	10	10	0	0	0	0	10	10	10	0	0	0	0	0
-0	-0	110	90	0	0	0	0	120	100	90	0	0	0	0	0
-0	-0	10	10	10	10	10	10	10	10	10	10	0	0	0	0
-0	-0	110	110	90	90	90	90	120	90	80	70	0	0	0	0
-0	10	10	10	10	10	10	10	10	10	10	10	0	0	0	13
-0	120	120	120	90	90	90	90	90	90	90	80	0	0	0	45
-0	10	10	10	10	10	10	10	10	10	10	10	10	10	22	27
-0	130	120	120	90	70	90	90	90	90	90	70	70	60	240	350
-0	10	10	10	10	10	13	12	10	10	0	0	0	10	16	17
-0	130	120	120	90	90	90	110	110	80	0	0	0	45	40	190
-0	-0	10	10	10	10	10	10	0	0	0	0	0	0	0	0
-0	-0	120	110	120	120	90	100	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	120	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	100	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	90	90	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	110	110	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	10	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	90	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 0
RIGHT SECTION

-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	15 45	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	17 60	22 45	23 45	-0 -0	-0 -0	0 0	0 0	0 0	0 0	15 180	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	20 60	22 315	25 10	22 350	18 360	11 270	0 0	0 0	-0 -0	-0 -0	-0 -0	20 150	-0 -0
33 330	-0 -0	-0 -0	29 280	26 135	23 330	21 315	16 300	11 270	0 0	0 0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
27 350	28 30	28 70	27 90	25 150	22 300	19 310	17 290	12 280	10 270	0 0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
24 340	25 360	25 45	25 100	25 180	22 160	19 315	17 290	13 270	13 270	11 270	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
25 320	28 330	28 360	28 20	27 250	22 190	19 235	18 240	17 270	17 270	15 280	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
29 330	34 330	35 320	36 315	34 260	30 210	25 225	23 240	20 290	19 280	19 260	19 260	21 280	15 280	-0 -0	-0 -0
31 330	37 320	42 315	43 270	44 270	45 240	45 220	46 240	29 270	23 270	23 270	23 270	25 280	10 290	10 250	-0 -0
31 320	35 300	39 300	39 290	40 260	40 240	38 240	31 250	28 260	23 260	23 270	28 270	21 270	-0 -0	-0 -0	-0 -0
27 315	32 300	35 310	33 270	39 260	28 230	27 250	27 250	23 250	20 260	20 270	30 280	19 290	-0 -0	-0 -0	-0 -0
15 270	21 300	29 280	27 270	35 240	25 230	25 240	22 240	20 250	18 260	18 280	18 280	20 300	-0 -0	-0 -0	-0 -0
0 0	0 0	14 225	20 240	32 225	22 250	22 240	19 230	17 235	16 270	16 280	16 290	15 330	20 300	-0 -0	-0 -0
0 0	0 0	10 230	13 230	16 220	15 225	10 230	11 230	13 235	14 270	14 290	14 310	10 330	20 315	-0 -0	-0 -0
0 0	10 200	13 220	14 225	11 210	0 0	0 0	0 0	11 200	12 270	12 350	12 340	15 360	20 340	13 315	-0 -0
21 135	22 180	18 190	13 210	10 225	0 0	0 0	0 0	0 0	0 0	0 0	10 360	20 360	10 20	0 0	-0 -0
23 180	19 175	16 190	12 180	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	20 360	0 0	0 0	-0 -0
17 180	16 170	12 170	10 170	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	20 60	0 0	-0 -0	-0 -0
10 170	10 160	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	20 60	-0 -0	-0 -0	-0 -0
10 150	10 150	0 0	10 120	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	20 360	-0 -0	-0 -0	-0 -0
10 125	10 140	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	15 20	-0 -0	-0 -0	-0 -0
0 0	10 140	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	10 30	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 1
LEFT SECTION

-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	10 340
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	11 840
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	11 300
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	14 300
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	18 225
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	17 220	23 220	25 225
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	27 250	25 270	13 270	20 220	20 220	23 60	25 270	22 250	24 270
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	11 250	17 270	20 250	25 250	23 270	23 220	28 220	43 70	29 270	10 270	23 270
-0 -0	-0 -0	0 0	0 0	0 0	0 0	10 270	10 270	13 250	13 230	15 250	30 225	80 60	45 90	0 0	20 60
-0 -0	-0 -0	11 130	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	10 350	30 360	25 340	0 0	17 60
-0 -0	-0 -0	12 130	13 120	10 120	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	22 90
-0 -0	10 160	0 0	10 120	10 90	10 70	10 60	10 90	10 90	10 90	0 0	0 0	0 0	0 0	21 100	24 100
-0 -0	10 150	12 120	12 120	10 100	10 110	10 60	10 60	10 90	10 80	0 0	0 0	0 0	20 70	23 60	24 60
-0 -0	10 120	15 120	10 120	15 100	13 90	13 90	10 90	10 90	0 0	0 0	0 0	0 0	0 0	22 135	24 170
-0 -0	-0 -0	0 0	10 120	0 0	0 0	0 0	0 0	13 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	0 0	15 90	0 0	0 0	0 0	0 0	0 0	0 0	10 170
-0 -0	-0 -0	-0 -0	-0 -0	0 0	10 100	10 90	0 0	0 0	10 60	0 0	0 0	0 0	0 0	0 0	15 170
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	10 90	10 90	0 0	0 0	0 0	0 0	0 0	0 0	0 0	10 160
-0 -0	-0 -0	-0 -0	-0 -0	0 0	10 90	10 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	10 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	10 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 1
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	12	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	80	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	19	24	23	-0	-0	15	10	0	0	0	-0	-0
-0	-0	-0	-0	60	80	80	-0	-0	130	150	0	0	0	-0	-0
-0	-0	-0	12	17	32	28	23	21	15	0	-0	-0	-0	10	-0
-0	-0	-0	60	60	80	80	100	130	160	0	-0	-0	-0	60	-0
0	-0	-0	18	29	32	28	24	21	16	10	-0	-0	-0	-0	-0
0	-0	-0	60	80	90	100	110	150	160	180	-0	-0	-0	-0	-0
16	17	18	22	31	30	28	27	23	21	16	-0	-0	-0	-0	-0
330	360	360	60	60	60	90	140	150	180	170	-0	-0	-0	-0	-0
21	26	28	29	34	31	29	29	30	30	32	-0	-0	-0	-0	-0
330	350	30	10	40	360	180	190	210	210	180	-0	-0	-0	-0	-0
23	33	38	41	41	38	38	38	31	20	15	-0	-0	-0	-0	-0
330	330	350	315	400	290	270	260	225	210	180	-0	-0	-0	-0	-0
26	38	48	52	53	41	41	41	19	20	21	21	18	25	-0	-0
310	330	300	280	270	270	260	260	220	240	250	180	225	270	-0	-0
28	42	52	52	51	52	50	45	40	33	28	23	18	25	25	-0
300	270	270	270	270	240	260	260	220	240	240	260	270	270	280	-0
28	38	43	40	38	29	43	42	41	33	27	22	17	-0	-0	-0
230	270	270	280	270	260	260	250	250	240	250	270	290	-0	-0	-0
28	32	35	30	28	27	28	25	26	27	22	21	15	-0	-0	-0
230	290	290	280	270	270	250	225	250	250	260	260	280	-0	-0	-0
25	28	35	28	23	24	25	23	19	19	19	19	15	-0	-0	-0
270	280	330	315	10	60	225	225	210	220	280	270	290	-0	-0	-0
23	27	36	30	16	21	22	21	18	17	17	17	20	20	-0	-0
270	340	340	270	10	225	250	230	200	220	290	260	300	310	-0	-0
25	28	19	0	0	0	11	13	15	15	15	15	20	20	-0	-0
60	60	60	0	0	0	260	225	200	220	280	300	310	310	-0	-0
25	22	14	0	0	0	0	11	15	14	14	14	15	20	10	-0
60	60	60	0	0	0	0	220	200	270	300	330	330	340	340	-0
24	22	18	11	0	0	11	13	12	12	12	12	10	20	10	-0
140	60	210	200	0	0	180	190	180	130	360	360	360	20	360	-0
22	18	16	13	0	0	0	0	0	10	11	11	10	20	10	-0
180	180	180	200	0	0	0	0	0	100	90	360	360	20	20	-0
21	18	16	10	0	0	0	0	0	0	0	0	0	20	-0	-0
180	160	160	150	0	0	0	0	0	0	0	0	0	20	-0	-0
0	20	15	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	160	130	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	20	15	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	160	130	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
135	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 3
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	150
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	180
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	210
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	210
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	18	17	12
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	210	225	210
-0	-0	-0	-0	-0	-0	-0	31	33	33	32	19	18	25	20	11
-0	-0	-0	-0	-0	-0	-0	300	300	290	270	210	240	210	225	210
-0	-0	-0	-0	-0	30	33	31	29	28	35	35	30	25	20	15
-0	-0	-0	-0	-0	350	330	300	290	290	250	230	230	230	140	160
-0	-0	10	16	20	20	20	20	19	20	25	25	25	27	10	17
-0	-0	130	30	360	360	330	300	290	290	250	230	225	230	135	60
-0	-0	0	0	0	0	0	0	0	10	15	18	20	23	20	12
-0	-0	0	0	0	0	0	0	0	270	225	225	225	135	135	60
-0	-0	0	0	0	0	0	0	0	0	0	12	17	19	23	0
-0	-0	0	0	0	0	0	0	0	0	0	225	135	90	60	0
-0	10	10	10	10	12	0	0	0	0	0	0	13	17	20	17
-0	130	90	100	100	70	0	0	0	0	0	0	90	70	60	60
-0	10	10	15	12	15	15	10	0	0	0	0	11	15	17	20
-0	150	100	120	70	70	80	80	0	0	0	0	90	70	45	170
-0	10	12	15	15	15	12	10	10	0	0	0	0	0	13	10
-0	80	70	70	70	80	70	100	90	0	0	0	0	0	135	170
-0	-0	10	10	10	10	0	0	0	10	0	0	0	0	0	0
-0	-0	120	90	100	100	0	0	0	90	0	0	0	0	0	0
-0	-0	-0	-0	10	10	0	0	10	0	10	0	0	0	0	0
-0	-0	-0	-0	60	100	0	0	90	0	80	0	0	0	0	0
-0	-0	-0	-0	0	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	100	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	10
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	120
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	10	15	10	10	0	0	0	0	10	0	0
-0	-0	-0	-0	0	90	90	110	110	0	0	0	0	120	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 3
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	15	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	-0	70	-0	-0	-0	-0	0	0	0	-0	-0	-0
-0	-0	-0	-0	15	23	25	-0	-0	20	11	0	0	0	-0	-0
-0	-0	-0	-0	45	60	80	-0	-0	120	150	0	0	0	-0	-0
-0	-0	-0	10	23	31	30	25	25	23	17	-0	-0	-0	0	-0
-0	-0	-0	30	30	60	70	90	120	120	140	-0	-0	-0	0	-0
0	-0	-0	15	28	34	29	27	30	29	21	-0	-0	-0	-0	-0
0	-0	-0	20	30	30	60	80	120	135	180	-0	-0	-0	-0	-0
16	18	18	23	32	36	25	30	38	33	28	-0	-0	-0	-0	-0
320	320	360	10	20	360	360	315	270	225	200	-0	-0	-0	-0	-0
24	28	31	33	38	39	35	42	41	35	30	-0	-0	-0	-0	-0
310	320	330	315	350	340	315	300	270	250	225	-0	-0	-0	-0	-0
29	33	38	41	48	50	51	49	40	35	30	-0	-0	-0	-0	-0
310	310	310	300	320	310	290	270	270	260	250	-0	-0	-0	-0	-0
30	36	42	48	53	54	56	51	45	42	35	23	20	10	-0	-0
300	310	300	290	280	300	280	270	270	260	220	230	230	230	-0	-0
22	35	42	45	48	52	55	53	50	45	32	25	10	10	10	-0
210	250	300	290	290	300	270	270	270	270	230	220	230	230	230	-0
11	28	39	42	36	30	40	36	35	35	32	25	0	-0	-0	-0
210	250	270	300	300	300	300	290	270	270	230	230	0	-0	-0	-0
0	15	26	35	28	27	27	27	28	28	27	19	0	-0	-0	-0
0	250	300	315	310	300	315	290	240	260	240	260	0	-0	-0	-0
11	0	10	11	20	24	25	25	25	25	21	10	0	-0	-0	-0
180	0	300	315	340	360	360	300	250	250	250	270	0	-0	-0	-0
13	0	0	13	21	22	22	22	23	22	18	15	10	15	-0	-0
40	0	0	315	45	45	225	225	240	250	250	200	270	315	-0	-0
11	11	10	22	24	15	0	15	22	20	16	14	10	15	-0	-0
60	70	60	45	60	230	0	225	210	240	250	270	270	315	-0	-0
0	0	15	22	22	15	0	0	20	17	15	12	10	10	10	-0
0	0	60	230	235	220	0	0	180	225	225	270	320	330	315	-0
0	0	13	18	18	15	0	0	15	13	13	10	10	15	10	-0
0	0	220	230	210	220	0	0	170	180	180	60	350	350	350	-0
0	0	10	12	13	12	0	0	10	10	10	10	10	10	10	-0
0	0	210	210	210	130	0	0	120	110	90	70	350	20	30	-0
0	0	0	0	0	0	0	0	0	0	0	0	10	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	90	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	10	20	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	100	90	-0	-0	-0
20	0	10	0	0	0	0	0	0	0	10	20	30	-0	-0	-0
140	0	120	0	0	0	0	0	0	0	100	90	90	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	10	20	30	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	100	90	90	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	10	20	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	90	90	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	10	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	90	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 6
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30	18	15
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	225	180
-0	-0	-0	-0	-0	-0	-0	15	25	35	45	20	27	34	21	10
-0	-0	-0	-0	-0	-0	-0	310	340	340	300	315	270	270	210	160
-0	-0	-0	-0	-0	15	15	23	15	20	38	36	33	35	18	10
-0	-0	-0	-0	-0	330	290	310	340	340	340	270	270	270	210	160
-0	-0	0	0	10	10	21	32	27	27	45	53	42	22	10	11
-0	-0	0	0	300	330	300	300	330	340	330	240	225	220	200	180
-0	-0	0	0	0	0	19	25	30	40	40	30	18	0	0	10
-0	-0	0	0	0	0	400	300	330	340	330	240	270	0	0	90
-0	-0	0	10	10	10	13	12	10	12	10	0	0	0	0	0
-0	-0	0	140	90	70	30	300	330	340	330	0	0	0	0	0
-0	0	10	13	10	10	10	0	0	0	0	0	0	0	0	22
-0	0	120	135	90	90	70	0	0	0	0	0	0	0	0	60
-0	0	10	13	10	10	10	0	0	0	0	0	0	0	0	15
-0	0	130	90	90	90	90	0	0	0	0	0	0	0	0	45
-0	15	10	15	10	12	15	0	0	0	0	0	0	0	0	0
-0	120	110	70	70	90	70	0	0	0	0	0	0	0	0	0
-0	-0	10	15	15	15	13	0	0	0	0	0	0	0	0	0
-0	-0	80	70	70	90	70	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	0	10	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	70	0	80	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	15	0	10	0	0	0	0	0	0	0	0	10
-0	-0	-0	-0	70	0	80	0	0	0	0	0	0	0	0	150
-0	-0	-0	-0	10	0	10	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	120	0	90	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	10	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	90	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	10	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	120	120	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	10	10	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	90	90	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 6
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	10	-0	-0	-0	-0	15	0	0	-0	-0	-0
-0	-0	-0	-0	-0	30	-0	-0	-0	-0	90	0	0	-0	-0	-0
-0	-0	-0	-0	27	22	15	-0	-0	0	12	0	0	0	-0	-0
-0	-0	-0	-0	360	10	30	-0	-0	0	135	0	0	0	-0	-0
-0	-0	-0	20	35	35	25	17	10	0	13	-0	-0	-0	0	-0
-0	-0	-0	60	360	360	30	30	90	0	135	-0	-0	-0	0	-0
0	-0	-0	20	40	47	38	25	17	17	20	-0	-0	-0	-0	-0
0	-0	-0	360	360	360	360	360	220	180	200	-0	-0	-0	-0	-0
0	0	0	12	35	45	52	40	30	28	30	-0	-0	-0	-0	-0
0	0	0	300	360	360	340	340	220	200	210	-0	-0	-0	-0	-0
0	0	0	10	10	27	48	50	40	48	45	-0	-0	-0	-0	-0
0	0	0	300	330	350	330	330	270	225	250	-0	-0	-0	-0	-0
0	17	25	29	25	30	42	47	51	35	40	-0	-0	-0	-0	-0
0	220	270	270	330	250	320	320	270	250	250	-0	-0	-0	-0	-0
10	20	30	43	52	53	50	44	27	25	42	34	21	0	-0	-0
180	220	270	270	270	330	320	315	270	270	250	210	225	0	-0	-0
10	18	27	32	42	50	53	41	47	52	45	32	23	0	0	-0
210	225	270	300	310	310	310	290	290	270	250	225	225	0	0	-0
12	15	10	25	27	30	35	29	29	30	31	27	17	-0	-0	-0
210	225	270	270	300	290	290	290	290	270	250	250	225	-0	-0	-0
15	13	11	13	19	20	22	22	10	0	12	19	10	-0	-0	-0
210	225	270	270	290	290	280	270	290	0	250	220	270	-0	-0	-0
15	13	0	0	0	0	0	24	20	10	0	0	0	-0	-0	-0
210	225	0	0	0	0	0	270	225	270	0	0	0	-0	-0	-0
12	15	12	10	0	0	0	20	22	16	10	0	0	0	-0	-0
210	225	180	330	0	0	0	225	225	250	270	0	0	0	-0	-0
10	15	15	12	0	0	0	17	18	16	12	0	0	0	-0	-0
120	90	90	80	0	0	0	125	220	250	270	0	0	0	-0	-0
18	19	15	12	0	0	0	12	15	14	12	0	0	0	0	-0
90	70	70	70	0	0	0	200	200	225	270	0	0	0	0	-0
25	19	12	11	0	0	0	11	13	12	11	10	0	0	0	-0
90	135	170	180	0	0	0	180	180	180	90	10	0	0	0	-0
18	15	0	0	0	0	0	0	10	10	0	15	0	0	0	-0
210	190	0	0	0	0	0	0	130	120	0	30	0	0	0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
190	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
20	10	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
150	160	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
150	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	10	10	10	0	0	-0	-0
0	0	0	0	0	0	0	0	0	70	60	60	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE
TIME 9
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	11
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	14
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	120
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	160
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	19
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	180
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	23
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	180
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	24	25	28
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	225	180
-0	-0	-0	-0	-0	-0	-0	13	18	21	24	25	29	31	32	35
-0	-0	-0	-0	-0	-0	-0	300	330	320	290	330	315	300	250	180
-0	-0	-0	-0	-0	0	0	14	20	22	25	28	32	35	33	28
-0	-0	-0	-0	-0	0	0	300	300	330	300	300	300	300	270	150
-0	-0	0	0	10	0	0	12	20	22	25	27	30	30	28	18
-0	-0	0	0	290	0	0	300	300	330	330	330	300	300	270	150
-0	-0	0	0	0	0	0	10	13	18	20	21	23	25	22	12
-0	-0	0	0	0	0	0	270	315	315	300	330	315	300	270	150
-0	-0	0	0	10	0	0	0	0	10	12	14	17	0	17	10
-0	-0	0	0	180	0	0	0	0	315	330	330	330	0	360	360
-0	0	0	0	10	10	0	0	0	0	0	0	0	0	10	10
-0	0	0	0	120	120	0	0	0	0	0	0	0	0	360	10
-0	15	10	0	10	15	15	0	0	0	0	0	0	0	0	0
-0	120	120	0	120	120	30	0	0	0	0	0	0	0	0	0
-0	15	10	10	0	0	0	0	0	0	0	0	0	0	0	0
-0	135	120	135	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	10	10	10	0	0	0	0	0	0	0	0	0	0	0
-0	-0	120	120	135	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	13	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	120	120	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	10	10	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	90	120	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 9
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	27	-0	-0	-0	-0	15	15	20	-0	-0	-0
-0	-0	-0	-0	-0	45	-0	-0	-0	-0	100	120	135	-0	-0	-0
-0	-0	-0	-0	20	33	33	-0	-0	23	30	20	23	22	-0	-0
-0	-0	-0	-0	20	30	30	-0	-0	90	135	120	140	150	-0	-0
-0	-0	-0	10	25	33	35	33	21	30	33	-0	-0	-0	20	-0
-0	-0	-0	10	10	360	20	20	60	90	180	-0	-0	-0	180	-0
0	-0	-0	13	22	32	40	35	25	31	30	-0	-0	-0	-0	-0
0	-0	-0	330	360	340	360	360	330	270	210	-0	-0	-0	-0	-0
11	13	12	15	18	25	41	48	29	35	35	-0	-0	-0	-0	-0
90	210	220	315	340	340	340	340	310	270	210	-0	-0	-0	-0	-0
17	22	16	18	18	20	37	60	40	50	50	-0	-0	-0	-0	-0
90	210	225	300	320	320	330	315	300	270	270	-0	-0	-0	-0	-0
21	25	18	20	27	35	48	53	53	48	40	-0	-0	-0	-0	-0
180	210	225	310	300	320	320	290	290	270	270	-0	-0	-0	-0	-0
27	29	20	18	28	42	52	61	58	45	35	25	20	20	-0	-0
180	180	225	300	300	315	310	290	290	270	200	250	240	225	-0	-0
30	30	22	18	20	40	49	48	48	45	37	25	17	20	10	-0
180	180	240	290	300	300	310	290	270	260	260	250	240	230	220	-0
33	32	26	19	15	20	35	28	29	37	30	25	13	-0	-0	-0
180	180	240	250	300	300	300	290	300	270	260	250	240	-0	-0	-0
33	33	30	20	15	15	18	21	28	35	33	25	10	-0	-0	-0
180	180	170	180	315	315	310	300	300	270	260	250	230	-0	-0	-0
25	30	33	18	15	15	16	20	31	32	30	15	0	-0	-0	-0
150	150	160	140	120	315	330	310	260	270	260	250	0	-0	-0	-0
20	15	18	20	15	14	18	23	27	20	17	10	0	10	-0	-0
250	150	160	130	120	100	100	220	215	280	290	290	0	330	-0	-0
15	15	12	20	15	17	18	22	18	0	12	12	0	10	-0	-0
260	210	120	130	100	90	200	200	215	0	190	270	0	330	-0	-0
10	15	12	22	23	20	12	15	10	0	10	10	0	15	0	-0
150	150	120	160	210	210	200	180	210	0	270	300	0	340	0	-0
10	12	20	23	21	12	0	0	0	0	0	0	0	20	10	-0
60	90	120	160	200	200	0	0	0	0	0	0	0	120	30	-0
0	13	21	22	0	0	0	0	0	0	0	0	0	20	10	-0
0	130	240	160	0	0	0	0	0	0	0	0	0	30	30	-0
0	0	13	15	0	0	0	0	0	0	0	0	0	15	-0	-0
0	0	160	160	0	0	0	0	0	0	0	0	0	30	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 12
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	13	13
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	270	225
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	280	270
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	27
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	18
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	140
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	12
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	225
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	17
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	250
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	19	17	25
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	310	280	270
-0	-0	-0	-0	-0	-0	-0	0	11	22	27	30	32	30	20	15
-0	-0	-0	-0	-0	-0	-0	0	310	300	330	315	315	310	280	270
-0	-0	-0	-0	-0	0	0	10	15	20	30	35	35	35	35	10
-0	-0	-0	-0	-0	0	0	310	315	290	300	315	315	300	300	290
-0	-0	0	0	0	0	12	18	22	28	30	30	30	30	30	32
-0	-0	0	0	0	0	300	310	315	300	330	315	315	300	300	190
-0	-0	0	0	0	0	10	12	21	22	24	25	25	23	17	20
-0	-0	0	0	0	0	315	310	315	330	315	315	270	250	270	180
-0	-0	0	0	0	0	0	0	0	0	15	20	20	15	12	15
-0	-0	0	0	0	0	0	0	0	0	330	330	270	270	270	340
-0	10	10	0	10	0	10	0	0	0	0	10	10	0	15	20
-0	150	90	0	60	0	45	0	0	0	0	360	300	0	30	360
-0	10	10	0	10	10	10	0	0	0	0	0	0	0	18	27
-0	140	120	0	90	60	60	0	0	0	0	0	0	0	30	360
-0	20	20	10	0	0	10	15	0	0	10	0	0	0	0	25
-0	90	90	90	0	0	100	100	0	0	45	0	0	0	0	330
-0	-0	15	15	0	0	0	0	0	0	10	0	0	0	0	0
-0	-0	90	90	0	0	0	0	0	0	60	0	0	0	0	0
-0	-0	-0	-0	0	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	120	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	10	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	120	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	10	0	0	0	0	0	0	0	0	10	0
-0	-0	-0	-0	0	100	0	0	0	0	0	0	0	0	270	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	0	0	0	0	0	0	0
-0	-0	-0	-0	0	10	0	0	0	10	10	10	0	0	0	0
-0	-0	-0	-0	0	110	0	0	0	90	90	90	0	0	0	0
-0	-0	-0	-0	15	0	15	0	0	10	10	10	0	0	0	0
-0	-0	-0	-0	100	0	120	0	0	90	90	90	0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 12
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	11	-0	-0	-0	-0	40	10	20	-0	-0	-0
-0	-0	-0	-0	-0	30	-0	-0	-0	-0	60	330	135	-0	-0	-0
-0	-0	-0	-0	0	16	23	-0	-0	40	33	15	20	20	-0	-0
-0	-0	-0	-0	0	10	10	-0	-0	30	30	340	200	200	-0	-0
-0	-0	-0	0	0	18	25	25	25	40	25	-0	-0	-0	30	-0
-0	-0	-0	0	0	360	360	10	10	30	150	-0	-0	-0	200	-0
-20	-0	-0	0	0	19	28	30	25	35	20	-0	-0	-0	-0	-0
110	-0	-0	0	0	360	360	360	10	360	315	-0	-0	-0	-0	-0
30	22	13	0	0	18	31	42	30	30	20	-0	-0	-0	-0	-0
90	135	135	0	0	340	330	330	315	315	300	-0	-0	-0	-0	-0
33	33	22	0	0	16	35	52	45	42	30	-0	-0	-0	-0	-0
135	160	140	0	0	315	330	320	315	300	270	-0	-0	-0	-0	-0
23	30	32	18	12	17	35	43	45	48	45	-0	-0	-0	-0	-0
180	180	140	180	225	300	310	310	315	300	270	-0	-0	-0	-0	-0
17	20	25	25	17	15	20	41	45	45	43	35	35	35	-0	-0
180	200	150	210	225	300	300	300	300	290	270	270	250	250	-0	-0
19	23	31	32	23	17	19	35	50	45	42	38	20	20	20	-0
180	220	160	210	210	225	300	300	300	290	290	270	250	250	250	-0
33	35	35	33	27	20	33	25	17	20	33	33	30	-0	-0	-0
180	225	170	210	210	220	290	300	300	290	290	270	270	-0	-0	-0
20	40	35	33	29	12	0	0	10	25	22	22	20	-0	-0	-0
250	225	170	200	210	220	0	0	270	270	280	270	270	-0	-0	-0
40	30	30	32	32	20	0	0	10	13	13	10	10	-0	-0	-0
290	180	170	180	180	180	0	0	180	230	240	260	250	-0	-0	-0
22	15	25	28	30	25	11	0	0	0	0	10	10	10	-0	-0
180	180	170	135	120	210	210	0	0	0	0	260	250	290	-0	-0
18	13	20	21	22	19	13	11	10	11	0	10	10	10	-0	-0
360	180	180	180	180	120	230	210	225	180	0	250	330	340	-0	-0
0	0	15	15	17	17	15	15	13	12	11	0	15	10	0	-0
0	0	180	200	150	135	210	210	200	210	240	0	10	350	0	-0
15	15	19	22	15	15	12	15	0	15	15	0	10	10	0	-0
20	200	180	190	150	150	180	180	0	180	100	0	45	45	0	-0
33	32	23	20	13	12	0	0	0	12	0	10	20	10	0	-0
270	210	180	180	160	135	0	0	0	100	0	80	45	60	0	-0
35	25	15	0	10	0	0	0	0	0	0	0	10	0	-0	-0
270	210	180	0	160	0	0	0	0	0	0	0	60	0	-0	-0
20	0	15	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
200	0	180	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	10	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
200	0	160	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
10	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
200	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 15
LEFT SECTION

-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	10 60	20 70
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	29 60
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	28 45
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	19 310
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	15 290
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	20 270
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	19 270	30 250	25 260
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	21 310	23 315	22 330	26 315	25 300	25 290	20 280
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	0 0	28 310	32 310	28 315	32 315	32 315	25 290	23 290
-0 -0	-0 -0	0 0	10 135	0 0	0 0	12 315	11 315	15 300	25 310	32 310	33 310	35 315	35 315	35 315	30 270
-0 -0	-0 -0	10 160	10 135	10 180	0 0	12 315	12 315	19 315	23 315	26 310	28 310	32 300	32 290	32 315	27 270
-0 -0	-0 -0	13 160	10 135	10 135	0 0	0 0	0 0	0 0	10 330	20 210	21 310	23 300	25 290	25 300	21 360
-0 -0	15 130	13 120	10 120	10 135	10 135	0 0	0 0	0 0	0 0	0 0	0 0	10 315	15 320	15 280	15 330
-0 -0	15 120	10 90	10 120	10 120	10 135	10 120	0 0	10 45	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	15 120	10 120	10 120	12 120	10 120	10 120	10 110	0 0	10 60	20 60	10 30	0 0	0 0	0 0	0 0
-0 -0	-0 -0	10 120	15 120	10 120	10 120	10 100	10 100	10 90	15 70	20 60	10 45	10 60	10 20	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	15 120	13 120	10 100	10 100	10 90	0 0	10 70	0 0	10 60	10 45	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	12 70	13 100	10 100	10 100	10 100	0 0	0 0	0 0	0 0	0 0	10 45	0 0
-0 -0	-0 -0	-0 -0	-0 -0	15 70	13 100	10 120	10 100	10 100	0 0	0 0	0 0	0 0	10 60	10 60	0 0
-0 -0	-0 -0	-0 -0	-0 -0	12 90	0 0	0 0	0 0	10 90	10 70	10 70	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	10 130	10 120	0 0	10 100	10 90	10 70	10 70	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	10 120	10 90	10 90	10 90	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 15
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	30	30	15	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	70	45	160	-0	-0	-0
-0	-0	-0	-0	0	0	10	-0	-0	28	28	0	15	10	-0	-0
-0	-0	-0	-0	0	0	360	-0	-0	350	45	0	160	135	-0	-0
-0	-0	-0	0	0	0	27	16	25	45	42	-0	-0	-0	25	-0
-0	-0	-0	0	0	0	340	360	360	350	360	-0	-0	-0	190	-0
25	-0	-0	20	20	21	40	38	42	55	60	-0	-0	-0	-0	-0
135	-0	-0	210	270	300	330	360	360	300	320	-0	-0	-0	-0	-0
40	42	43	43	37	35	35	43	48	53	60	-0	-0	-0	-0	-0
60	160	140	200	270	300	320	330	340	310	300	-0	-0	-0	-0	-0
35	33	30	29	24	29	23	44	43	52	38	-0	-0	-0	-0	-0
135	170	150	150	225	300	315	320	320	310	270	-0	-0	-0	-0	-0
24	27	27	25	21	20	15	29	39	45	35	-0	-0	-0	-0	-0
270	200	160	160	180	270	315	320	315	300	270	-0	-0	-0	-0	-0
10	23	31	31	20	13	12	21	38	42	42	32	25	30	-0	-0
270	250	160	160	160	150	315	315	315	300	290	250	220	260	-0	-0
20	18	45	33	25	10	0	21	35	39	42	33	25	40	40	-0
270	260	160	160	160	150	0	315	315	300	290	270	220	250	250	-0
23	18	35	35	27	20	10	12	20	32	30	31	30	-0	-0	-0
260	250	150	160	150	150	180	315	315	300	290	290	230	-0	-0	-0
20	22	31	35	30	21	13	25	31	20	20	25	30	-0	-0	-0
270	225	225	160	150	150	160	150	315	300	270	290	250	-0	-0	-0
23	18	30	33	27	19	11	15	19	13	15	18	20	-0	-0	-0
225	225	230	240	150	150	160	150	300	300	280	270	300	-0	-0	-0
23	13	25	32	20	17	13	0	0	0	0	13	15	0	-0	-0
270	250	230	250	120	120	150	0	0	0	0	290	290	0	-0	-0
22	0	10	30	20	15	15	11	0	0	0	0	0	10	-0	-0
270	0	160	160	200	270	270	210	0	0	0	0	0	270	-0	-0
18	0	10	19	18	14	13	15	12	0	0	0	0	10	10	-0
30	0	160	180	180	170	180	180	190	0	0	0	0	340	340	-0
10	0	11	15	15	12	0	12	11	0	0	0	10	10	15	-0
20	0	180	180	140	150	0	160	190	0	0	0	45	60	60	-0
0	0	11	13	12	10	0	0	0	0	0	0	20	25	15	-0
0	0	170	180	140	150	0	0	0	0	0	0	60	60	60	-0
0	0	10	10	20	10	0	0	0	0	0	0	15	23	-0	-0
0	0	170	160	140	135	0	0	0	0	0	0	70	45	-0	-0
0	0	10	0	10	0	0	0	0	0	0	0	10	-0	-0	-0
0	0	180	0	140	0	0	0	0	0	0	0	70	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	10	10	10	0	0	-0	-0
0	0	0	0	0	0	0	0	0	90	80	80	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 18
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25	31
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	90
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	35
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	70
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	35
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	28
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	315
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	315
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	315
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	25	22	31
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	280	280	270
-0	-0	-0	-0	-0	-0	-0	0	13	23	20	22	22	20	20	20
-0	-0	-0	-0	-0	-0	-0	0	300	330	330	300	320	315	330	270
-0	-0	-0	-0	-0	0	0	15	15	20	23	23	25	30	27	20
-0	-0	-0	-0	-0	0	0	300	300	315	300	300	225	200	270	270
-0	-0	10	12	10	15	12	15	15	17	17	18	25	32	35	28
-0	-0	170	225	270	270	280	300	300	270	300	300	310	225	280	280
-0	-0	0	0	0	0	0	10	10	13	13	13	18	25	30	26
-0	-0	0	0	0	0	0	230	270	270	250	315	310	300	300	280
-0	-0	0	0	15	0	0	0	0	0	10	10	12	15	17	17
-0	-0	0	0	225	0	0	0	0	0	225	30	360	310	290	315
-0	0	10	15	10	0	0	0	0	0	0	0	0	10	13	12
-0	0	120	120	100	0	0	0	0	0	0	0	0	330	300	300
-0	13	10	10	0	0	0	0	0	0	0	0	0	0	0	0
-0	110	120	120	0	0	0	0	0	0	0	0	0	0	0	0
-0	10	10	0	10	0	0	0	0	0	10	10	0	0	0	0
-0	100	100	0	120	0	0	0	0	0	60	30	0	0	0	0
-0	-0	10	10	10	10	12	13	15	10	15	10	0	0	0	0
-0	-0	110	110	120	120	120	120	100	70	90	70	0	0	0	0
-0	-0	-0	-0	10	0	15	15	10	10	10	10	10	10	0	10
-0	-0	-0	-0	135	0	110	100	100	70	90	90	80	60	0	30
-0	-0	-0	-0	10	10	12	15	10	10	10	10	10	10	0	0
-0	-0	-0	-0	120	135	100	80	90	70	90	80	80	70	0	0
-0	-0	-0	-0	10	0	10	10	0	10	10	15	12	10	0	0
-0	-0	-0	-0	90	0	90	90	0	80	80	80	90	90	0	0
-0	-0	-0	-0	10	10	0	0	0	10	15	15	10	10	0	0
-0	-0	-0	-0	100	90	0	0	0	80	80	80	100	100	0	0
-0	-0	-0	-0	15	10	0	0	0	0	15	20	15	0	0	0
-0	-0	-0	-0	110	90	0	0	0	0	90	90	90	0	0	0
-0	-0	-0	-0	10	10	10	10	0	0	10	15	10	0	0	0
-0	-0	-0	-0	90	90	80	80	0	0	90	90	90	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 18
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	15	15	20	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	10	75	225	-0	-0	-0
-0	-0	-0	-0	0	0	15	-0	-0	20	15	20	20	20	-0	-0
-0	-0	-0	-0	0	0	20	-0	-0	30	360	330	330	210	-0	-0
-0	-0	-0	17	15	15	15	19	25	28	27	-0	-0	-0	20	-0
-0	-0	-0	150	120	120	20	340	350	340	330	-0	-0	-0	210	-0
35	-0	-0	23	17	0	0	29	38	40	33	-0	-0	-0	-0	-0
100	-0	-0	150	160	0	0	330	350	325	320	-0	-0	-0	-0	-0
42	42	40	32	20	0	0	32	42	45	38	-0	-0	-0	-0	-0
110	135	135	150	170	0	0	315	350	320	315	-0	-0	-0	-0	-0
42	45	45	41	32	21	15	35	41	45	42	-0	-0	-0	-0	-0
270	180	135	150	160	180	225	315	315	320	315	-0	-0	-0	-0	-0
35	45	45	45	43	38	31	35	45	38	38	-0	-0	-0	-0	-0
290	270	225	135	150	150	210	280	315	315	315	-0	-0	-0	-0	-0
27	27	30	41	45	42	35	23	15	30	31	27	23	20	-0	-0
300	270	270	225	150	150	210	280	290	310	290	250	270	270	-0	-0
25	25	32	37	43	42	32	19	15	12	23	25	23	15	15	-0
300	250	250	240	200	180	180	170	270	300	290	270	270	250	250	-0
28	25	28	27	40	48	25	15	0	0	18	22	20	-0	-0	-0
300	250	260	250	250	225	200	170	0	0	290	270	270	-0	-0	-0
30	27	28	25	30	28	25	18	12	10	15	18	15	-0	-0	-0
300	260	260	250	250	230	190	170	240	230	270	280	270	-0	-0	-0
30	30	30	28	22	33	21	15	10	10	12	13	0	-0	-0	-0
300	260	260	250	235	210	200	170	250	260	250	270	0	-0	-0	-0
19	12	10	0	25	20	15	10	0	0	0	10	0	0	-0	-0
270	270	250	0	230	210	200	170	0	0	0	270	0	0	-0	-0
15	0	0	30	32	24	17	10	0	0	0	0	0	10	-0	-0
270	0	0	180	225	180	170	180	0	0	0	0	0	315	-0	-0
11	0	0	20	27	25	19	12	10	0	0	0	0	0	0	-0
290	0	0	180	210	210	225	180	190	0	0	0	0	0	0	-0
0	0	12	20	25	25	20	15	13	0	0	0	10	0	0	-0
0	0	180	170	200	180	270	170	170	0	0	0	30	0	0	-0
0	15	17	22	25	25	20	0	0	0	0	10	0	0	0	-0
0	240	225	190	190	140	135	0	0	0	0	80	0	0	0	-0
0	15	18	23	27	25	19	0	0	0	0	0	0	0	-0	-0
0	200	200	170	160	140	135	0	0	0	0	0	0	0	-0	-0
10	10	10	20	23	20	0	0	0	0	0	0	0	-0	-0	-0
290	270	90	140	135	135	0	0	0	0	0	0	0	-0	-0	-0
0	10	15	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	90	60	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 21
LEFT SECTION

-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	10 20	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	10 20	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	11 360
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	17 330
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	22 300
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	30 290
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	30 300	33 300	35 270
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	15 30	0 0	20 90	22 330	22 315	27 330	33 315	35 300	38 270
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	10 80	20 160	25 300	25 315	27 330	30 320	32 315	32 290
-0 -0	-0 -0	0 0	0 0	0 0	0 0	14 270	22 270	24 90	23 240	22 270	22 315	20 300	20 330	21 290	25 290
-0 -0	-0 -0	0 0	0 0	0 0	10 210	15 240	18 315	18 300	18 280	17 300	17 290	17 290	17 300	17 290	18 290
-0 -0	-0 -0	0 0	10 135	0 0	0 0	0 0	0 0	10 240	12 260	14 270	15 280	15 290	15 290	13 290	13 310
-0 -0	0 0	13 120	15 100	0 0	0 0	0 0	0 0	0 0	0 0	12 270	13 290	13 290	13 315	10 290	10 290
-0 -0	0 0	10 120	10 135	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	10 360	10 360	0 0	0 0
-0 -0	12 120	10 110	10 120	10 120	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	15 120	15 120	0 0	0 0	0 0	0 0	10 100	12 100	10 90	10 70	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	0 0	15 100	10 90	10 90	10 90	10 70	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	10 100	10 100	10 90	10 70	15 70	15 70	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	10 110	0 0	0 0	0 0	0 0	0 0	10 70	10 70	10 70	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	10 70	0 0	0 0	0 0	0 0	0 0	10 90	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	0 0	0 0	0 0	10 90	15 90	20 90	15 110	10 100	0 0
-0 -0	-0 -0	-0 -0	-0 -0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 21
RIGHT SECTION

-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	10 160	-0 -0	-0 -0	-0 -0	-0 -0	18 360	20 330	15 30	-0 -0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	14 180	17 160	17 360	-0 -0	-0 -0	20 360	31 360	20 330	15 20	15 210	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	17 180	21 120	24 135	18 360	0 0	11 360	20 360	38 340	-0 -0	-0 -0	-0 -0	15 210	-0 -0
0 0	-0 -0	-0 -0	25 225	30 160	31 170	20 150	10 300	32 300	30 300	42 340	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
10 135	20 120	25 135	31 135	32 180	32 180	30 180	33 170	37 290	32 300	32 315	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
18 140	25 280	31 150	33 160	35 160	35 180	32 180	28 170	20 230	18 300	22 315	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
22 290	30 225	33 210	35 200	35 180	35 200	35 210	28 210	25 225	25 270	23 270	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0
29 315	33 240	35 230	33 210	33 200	33 200	33 200	33 210	29 160	21 270	22 270	30 290	33 290	30 290	-0 -0	-0 -0
33 300	35 290	33 240	31 250	30 140	30 200	28 190	32 180	18 160	10 250	13 270	32 290	35 290	10 290	10 290	-0 -0
38 270	38 290	31 270	20 250	18 240	23 210	28 180	33 170	20 160	0 0	0 0	30 290	32 290	-0 -0	-0 -0	-0 -0
42 270	43 280	35 270	17 270	11 260	20 225	29 180	25 170	15 160	0 0	0 0	10 270	25 290	-0 -0	-0 -0	-0 -0
38 290	43 290	40 270	17 270	0 0	19 225	32 200	17 190	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
29 290	35 270	30 300	18 300	0 0	10 210	24 200	17 180	0 0	0 0	0 0	0 0	0 0	10 270	-0 -0	-0 -0
19 300	23 250	23 270	15 240	0 0	0 0	17 170	20 170	10 180	0 0	0 0	0 0	0 0	10 330	-0 -0	-0 -0
14 315	15 250	17 270	11 210	0 0	0 0	10 170	22 170	20 180	0 0	0 0	0 0	0 0	10 350	10 360	-0 -0
0 0	10 270	10 240	0 0	0 0	0 0	0 0	10 180	10 180	0 0	0 0	0 0	0 0	10 360	15 30	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	15 20	10 30	-0 -0
0 0	0 0	0 0	10 180	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	10 20	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0	-0 -0
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	-0 -0	-0 -0
-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0	-0 -0

Table D-1 Data: Case II (Continued)

BAER CASE
TIME 24
LEFT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	340
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	10
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0	60
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	10	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	60	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	60	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	20
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	360
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	30
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	33
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	35
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	290
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	22	33	32
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	300	300	290
-0	-0	-0	-0	-0	-0	-0	10	0	10	15	25	31	33	33	20
-0	-0	-0	-0	-0	-0	-0	70	0	360	330	315	330	315	300	300
-0	-0	-0	-0	-0	15	10	15	15	21	17	25	33	27	30	17
-0	-0	-0	-0	-0	70	45	45	45	30	10	315	310	330	315	300
-0	-0	10	10	13	13	10	18	20	23	23	25	21	20	25	22
-0	-0	190	210	210	270	300	60	60	270	270	280	310	330	360	250
-0	-0	10	0	0	10	12	20	23	23	23	20	15	13	20	18
-0	-0	180	0	0	225	270	290	270	270	280	280	300	300	260	250
-0	-0	15	15	12	10	0	0	10	10	10	0	0	0	10	0
-0	-0	150	110	100	150	0	0	260	270	280	0	0	0	270	0
-0	10	10	15	15	10	0	0	0	0	0	0	0	0	0	0
-0	140	150	120	120	135	0	0	0	0	0	0	0	0	0	0
-0	15	12	10	15	10	10	0	0	0	0	0	0	0	0	10
-0	120	135	135	135	135	135	0	0	0	0	0	0	0	0	360
-0	10	15	10	15	10	10	0	0	0	0	10	0	0	0	10
-0	100	100	135	135	135	135	0	0	0	0	45	0	0	0	10
-0	-0	15	15	15	10	10	0	0	0	0	0	0	0	0	10
-0	-0	120	120	120	135	135	0	0	0	0	0	0	0	0	45
-0	-0	-0	-0	15	12	15	10	15	15	20	10	0	0	0	10
-0	-0	-0	-0	210	120	120	120	60	70	60	60	0	0	0	45
-0	-0	-0	-0	15	15	15	15	15	15	15	20	0	10	0	0
-0	-0	-0	-0	100	90	90	90	90	90	70	60	0	70	0	0
-0	-0	-0	-0	10	12	12	10	10	12	13	15	10	0	0	0
-0	-0	-0	-0	120	120	90	90	90	90	70	60	60	0	0	0
-0	-0	-0	-0	0	0	10	0	10	12	15	10	15	0	0	0
-0	-0	-0	-0	0	0	90	0	70	90	100	70	70	0	0	0
-0	-0	-0	-0	0	0	0	0	0	10	15	15	20	20	0	0
-0	-0	-0	-0	0	0	0	0	0	90	90	90	80	80	0	0
-0	-0	-0	-0	0	0	0	0	0	10	15	10	0	0	0	0
-0	-0	-0	-0	0	0	0	0	0	90	80	90	0	0	0	0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

Table D-1 Data: Case II (Continued)

BAER CASE 2
TIME 24
RIGHT SECTION

-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	20	20	10	-0	-0	-0
-0	-0	-0	-0	-0	0	-0	-0	-0	-0	340	340	350	-0	-0	-0
-0	-0	-0	-0	20	20	0	-0	-0	10	25	20	10	10	-0	-0
-0	-0	-0	-0	90	135	0	-0	-0	350	340	340	350	340	-0	-0
-0	-0	-0	28	31	31	25	15	10	15	25	-0	-0	-0	10	-0
-0	-0	-0	100	90	90	150	150	320	350	340	-0	-0	-0	270	-0
0	-0	-0	32	35	38	35	20	15	25	25	-0	-0	-0	-0	-0
0	-0	-0	120	90	135	150	160	315	325	330	-0	-0	-0	-0	-0
10	20	32	35	38	50	45	25	20	28	30	-0	-0	-0	-0	-0
45	110	315	310	100	135	180	180	150	325	315	-0	-0	-0	-0	-0
30	35	42	38	35	30	47	35	30	33	32	-0	-0	-0	-0	-0
315	180	270	270	210	180	190	190	160	180	290	-0	-0	-0	-0	-0
40	43	42	37	30	20	43	40	33	20	18	-0	-0	-0	-0	-0
280	250	270	250	260	225	120	210	180	180	290	-0	-0	-0	-0	-0
43	45	39	35	25	23	30	37	35	28	18	15	17	20	-0	-0
280	270	250	230	230	260	270	210	180	180	210	290	280	280	-0	-0
38	37	37	35	33	30	35	30	33	32	25	20	30	30	20	-0
280	270	260	250	240	270	250	210	180	180	210	290	270	270	280	-0
28	30	34	33	35	40	32	20	28	33	33	31	28	-0	-0	-0
280	270	270	270	250	240	225	210	180	190	210	270	250	-0	-0	-0
25	32	32	30	28	28	22	17	25	31	20	19	15	-0	-0	-0
270	250	270	250	250	220	225	210	180	190	180	225	250	-0	-0	-0
23	27	28	15	12	15	15	18	25	20	15	10	0	-0	-0	-0
280	270	270	250	250	240	225	200	180	190	180	225	0	-0	-0	-0
17	22	20	0	0	10	13	18	22	15	10	0	0	0	-0	-0
270	270	250	0	0	240	230	200	200	190	180	0	0	0	-0	-0
10	0	0	10	10	15	15	18	18	15	0	0	0	0	-0	-0
270	0	0	250	250	240	230	190	190	190	0	0	0	0	-0	-0
0	12	20	30	30	25	18	15	15	12	0	0	0	0	0	-0
0	250	240	250	240	225	190	190	180	190	0	0	0	0	0	-0
12	15	18	25	28	19	17	15	15	12	10	0	0	0	0	-0
290	250	260	250	225	135	190	190	180	180	135	0	0	0	0	-0
13	12	0	13	18	17	15	15	15	12	12	0	0	0	30	-0
45	70	0	135	180	135	180	180	160	150	135	0	0	0	30	-0
0	0	0	0	12	15	15	0	0	0	0	0	0	20	-0	-0
0	0	0	0	160	130	180	0	0	0	0	0	0	45	-0	-0
0	0	0	0	10	13	15	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	135	130	150	0	0	0	0	0	0	-0	-0	-0
0	0	0	10	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	135	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0

APPENDIX E

NEW YORK UNIVERSITY
COLLEGE OF ENGINEERING
UNIVERSITY HEIGHTS, NEW YORK 53, N.Y.

DEPARTMENT OF METEOROLOGY AND OCEANOGRAPHY

TELEPHONE: LUDLOW 4-0700

3 November 1961

Mr. Ledolph Baer,
1020 Havre Court
Sunnyvale, Calif.

Dear Mr. Baer:

The purpose of this letter is to describe to you the way in which the data that we have furnished you with reference to the storm over the North Atlantic in December 1959 were obtained. The collection of this data has been a cooperative effort of a number of people who are interested in the study of gravity waves. They are

Dr. C.L. Bretschneider
Dr. J. Darbyshire
Dr. H.L. Crutcher
Dr. H. Miche
Dr. H. Walden
Dr. B.W. Wilson
Dr. W.J.Pierson, Jr.
Dr. G. Neumann

The original data were supplied to me by the National Institute of Oceanography. They were digitized with funds made available by the Office of Naval Research on their contract Nonr 285(03). The spectra were computed at New York University by Emanuel Mehr. Supplementary wind data were searched at the National Weather Records Center by Dr. Harold Crutcher and provided to us to supplement the wind fields that were deduced from both the British Weather Maps and from our Northern Hemisphere 6 hourly surface charts.

It is the intent of the above named group to publish these data as a report on a particularly severe storm in the North Atlantic ocean. Just when this publication will appear is not yet known as the paper has not been written, but all of the data for the paper is now available. Perhaps at this time each of the interested parties will then prepare forecasts of the waves based on the techniques with which he is most familiar to see how well the various methods work out.

Sincerely yours,

Willard Pierson

Willard J. Pierson, Jr.
Professor of Meteorology

WJP:EM